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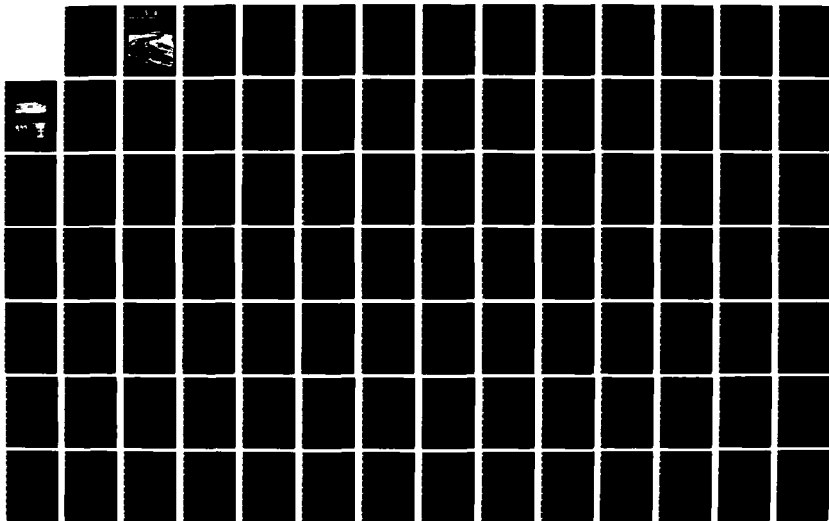
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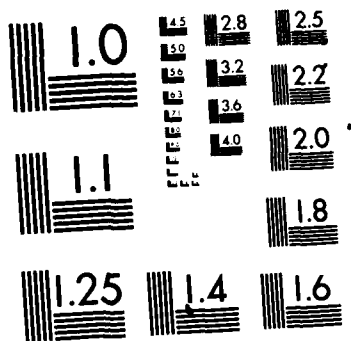
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BIRD AND MAMMAL USE OF MAIN STEM LEVEE BORROW PITS ALONG THE LOWER MISSISSIPPI RIVER

LOWER MISSISSIPPI RIVER ENVIRONMENTAL PROGRAM
REPORT 3
FEBRUARY 1986



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A study was conducted from 1981 to 1983 to determine bird and mammal use at 26 selected borrow pits along the main stem levee of the Lower Mississippi River. A total of 209 wild species were observed, and 271,931 animals were counted. The 186 bird species (267,779 individuals) included: waterbirds, 8.1 percent (15 species); waterfowl, 9.1 percent (16 species); shorebirds, 9.1 percent (17 species); seabirds, 3.8 percent (7 species); raptors, <div style="text-align: right;">(Continued)</div>		

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20. ABSTRACT (Continued).

9.1 percent (17 species); upland gamebirds, 2.2 percent (4 species); nonperching land birds, 8.6 percent (16 species); and songbirds, 50 percent (93 species). Birds were by far the most abundant wildlife in borrow pit habitats, making up 99 percent of all wild species observed. A total of 67 bird species were found nesting in borrow pit habitat, including: cavity nesters (17 species); colony nesters (8 species); other tree nesters (24 species); shrub nesters (9 species); levee nesters (5 species); other ground nesters (3 species); and brown-headed cowbirds which laid eggs in other birds' nests.

Twenty-three wild mammal species were found during the study; a total of 4,152 individuals were counted. These included 10 species of furbearers, 5 species of game mammals, and 8 species of nongame mammals. The largest number of mammals observed was white-tailed deer (703); 314 beavers, 366 raccoons, and 87 nutria were also observed.

A median one-way analysis (Chi Square approximation) was conducted on selected groups of animals to show differences among borrow pits, which were ranked according to numbers of observed wildlife using each pit. Pits in which group observations were larger than the 50th quartile (grand median) were considered significantly different ($P < 0.0001$) from those which were smaller than the grand median. Pit differences based on these analyses for each group are shown in the report.

Based on the data collected in the study, physical and surrounding land use features of borrow areas that would result in suitable wildlife habitat are:

- a. Land adjacent to pools vegetated with mixed bottomland hardwood forest (or developing riparian forest), with good vine and herbaceous understory.
- b. Moderate grazing or at least occasional mowing to maintain some open areas and habitat diversity.
- c. Flooding less than 1 month each year, but flooded often enough to rejuvenate and stimulate invertebrate and fish populations in the borrow pits.
- d. Depths such that some water pools are permanently maintained, even at drought conditions, and both shallow- and deep-water areas are provided.
- e. Size of at least 30 acres.
- f. Built more than 1 mile from the river where possible.
- g. Small islands of less than 1 acre in the borrow pits.

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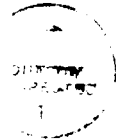
PREFACE

The Lower Mississippi River Environmental Program (LMREP) is being conducted by the Mississippi River Commission (MRC), US Army Corps of Engineers. It is a comprehensive program of environmental studies of the leveed floodplain of the Lower Mississippi River and the main stem Mississippi River and Tributaries (MR&T) Project. Results will provide an environmental inventory for the study area and will form the basis for development of environmental design considerations for channel improvement and main stem levee features of the MR&T Project.

One component of the LMREP is the Levee Borrow Pit Investigation (LBPI). As part of the LBPI, an investigation was conducted of bird and mammal occurrence and use of levee borrow pits along the Lower Mississippi River. Species analyzed in the report are those determined by the MRC staff to be most relevant to the LMREP objectives.

This research was conducted and the report written by the staff of the US Army Engineer Waterways Experiment Station (WES) Environmental Laboratory. Mr. Stephen P. Cobb and Dr. Thomas M. Pullen, Jr., of the MRC provided significant editorial input. Topographic surveys of borrow pits were made by the US Army Engineer District (USAED), Vicksburg. Calculations of borrow pit physical attributes were made by the staff of the Environmental Laboratory. Data analyses on animal groupings selected by the MRC were made by Applied Research and Analysis, Inc., Tallulah, La. Ms. Jessica S. Ruff of the WES Publications and Graphic Arts Division edited the report.

The investigation was managed by the Planning Divisions of the MRC and the USAED, Vicksburg. Mr. Cobb was the program manager for the LMREP. Mr. Jerry E. Scott, USAED, Vicksburg, was work unit manager. The investigation was conducted under the direction of the President of the Mississippi River Commission, MG William E. Read, CE, now retired.



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LOWER MISSISSIPPI RIVER ENVIRONMENTAL PROGRAM

BIRD AND MAMMAL USE OF MAIN STEM LEVEE BORROW PITS ALONG THE LOWER MISSISSIPPI RIVER

PART I: INTRODUCTION

Background

1. Flooding has hampered settlement and development along the Lower Mississippi River and associated floodplain for over two centuries. Destructive floods occurred in 1858, 1882, 1897, 1912, 1913, 1916, 1922, 1927, 1937, 1973, 1979, and 1983, and the river carries floods almost every year in late winter or spring. The devastating flood of 1927 prompted Congress to pass the Flood Control Act of 1928 authorizing the Mississippi River and Tributaries Project (MR&T), a comprehensive plan for flood control and navigation on the main stem Lower Mississippi River and tributary streams. The MR&T project is carried out by the Mississippi River Commission (MRC) and consists primarily of levee systems, channel improvements, and floodways.

2. The MRC has been conducting the Lower Mississippi River Environmental Program (LMREP) since 1981. This 7-year program, to be completed in 1987, addresses major features of the MR&T. The objectives of the LMREP are to develop baseline environmental data for the leveed floodplain of the lower river and to formulate environmental design considerations for channel improvement works (dikes and revetments) and the borrow pit and levee system. Fish and wildlife resources and habitat are the primary focus of the five LMREP work units, which include: levee borrow pits, dikes, revetments, habitat inventories, and development of a Computerized Environmental Resources Data System (CERDS).

Levee Borrow Pit Investigations (LBPI)

Levee borrow pits

3. Soil used to construct the main stem levees is obtained from adjacent land, usually between the levee and the river. Surface depressions resulting from excavation of such material are known as borrow pits. A series

of borrow pits is generally found along the riverward toe of the main stem levee system throughout its length.

Objectives

4. The LBPI was designed to provide data on fishery, benthos, wildlife, vegetation, physical, and chemical aspects of main stem levee borrow pits.

Specific objectives of the LBPI are:

- a. To develop an inventory of wildlife and fishery resources of the main stem levee system borrow pits;
- b. To formulate environmental design considerations for main stem levee system borrow pits.

Data acquisition

5. The first fieldwork of the LBPI included fish and aquatic sampling by the US Army Engineer Waterways Experiment Station (WES) from June through August 1981. Topographic surveys of selected pits were conducted by the US Army Engineer District (USAED), Vicksburg, in 1982. Wildlife surveys were carried out by WES on a seasonal basis for 2 years from December 1981 to October 1983. This report presents partial results of the wildlife study conducted as part of the LBPI.

Study area

6. The Lower Mississippi River flows from the confluence of the Ohio and Middle Mississippi Rivers at Cairo, Ill., to the Gulf of Mexico, a distance of approximately 975 river miles (RM). The portion of the river and leveed floodplain containing the study borrow pits extends from Cairo at RM 953.8 to Head of Passes (RM 0) at Venice, La. The Mississippi River is the fourth largest drainage basin in the world and drains 41 percent of the contiguous United States and part of Canada. The drainage area of the river is 1,245,000 square miles. At Vicksburg, Miss. (RM 437), the mean annual discharge of the river is 552,000 cubic feet per second (cfs); the mean annual maximum and minimum flows are 948,000 and 261,000 cfs, respectively. Overbank flooding along the river occurs during the fall, winter, and spring and varies considerably in time, stage, and duration from year to year. Highest stages are typically reached from March through May.

7. Soils inside* the floodplain levees are generally alluvial silts and silty clays, with some mixture of sand. The approximately 2.5 million acres in the leveed floodplain consist of 81 percent land and 19 percent water, which includes natural lakes, borrow pits, and the main river channel. About 1.2 million acres of forests occur on the floodplain. Within-levee vegetation includes large areas under row crop cultivation, and bottomland hardwoods and riparian softwoods such as willows and cottonwoods. Lakes and borrow pits containing permanent water pools total about 71,000 acres (Ryckman et al. 1975). Approximately 2.4 percent of the leveed floodplain is borrow pits.

8. The climate of the region is seasonally variable with low temperatures ranging from below 0° F in the north to a rare low of 20° F in the south. Southeast Missouri average temperatures are 38° F in winter and 81° F in summer; southern Louisiana average temperatures are 55° F (winter) and 81° F (summer). Note that while both summer averages are the same, winter averages are very different. Precipitation in the form of rainfall and snow generally averages 50 to 60 inches per year, except in southern Louisiana where rainfall may reach 100 inches per year.

9. The floodplain of the Lower Mississippi River is leveed along both banks. The main stem levees are continuous on the west bank except at the confluences of the St. Francis River and the Arkansas/White Rivers. The 26 borrow pits (BP's) studied generally occur along the riverward toe of the main stem levee and are located in the States of Missouri (2), Arkansas (3), Louisiana (15), Tennessee (1), and Mississippi (5) (Figure 1).

10. In 1973, approximately 44,700 acres of levee borrow pits were associated with the main stem levee system (Ryckman et al. 1975). Borrow pits account for approximately 42.5 percent of the abandoned channel lakes, oxbow lakes, and other floodplain lakes along the river and 10.1 percent of total aquatic habitat inside the levee (Cobb et al. 1984). The upgrading of over 400 miles of the existing levee and construction of seepage berms is estimated to create an additional 11,400 acres of new borrow pits.

11. Borrow pits are often similar to farm ponds and small man-made lakes in design and use, but are unique in being subjected to regular river flooding. Human use of borrow pits includes sport and commercial fishing,

* Borrow pits inside the levee are on the river side; pits outside the levee are on the land side.

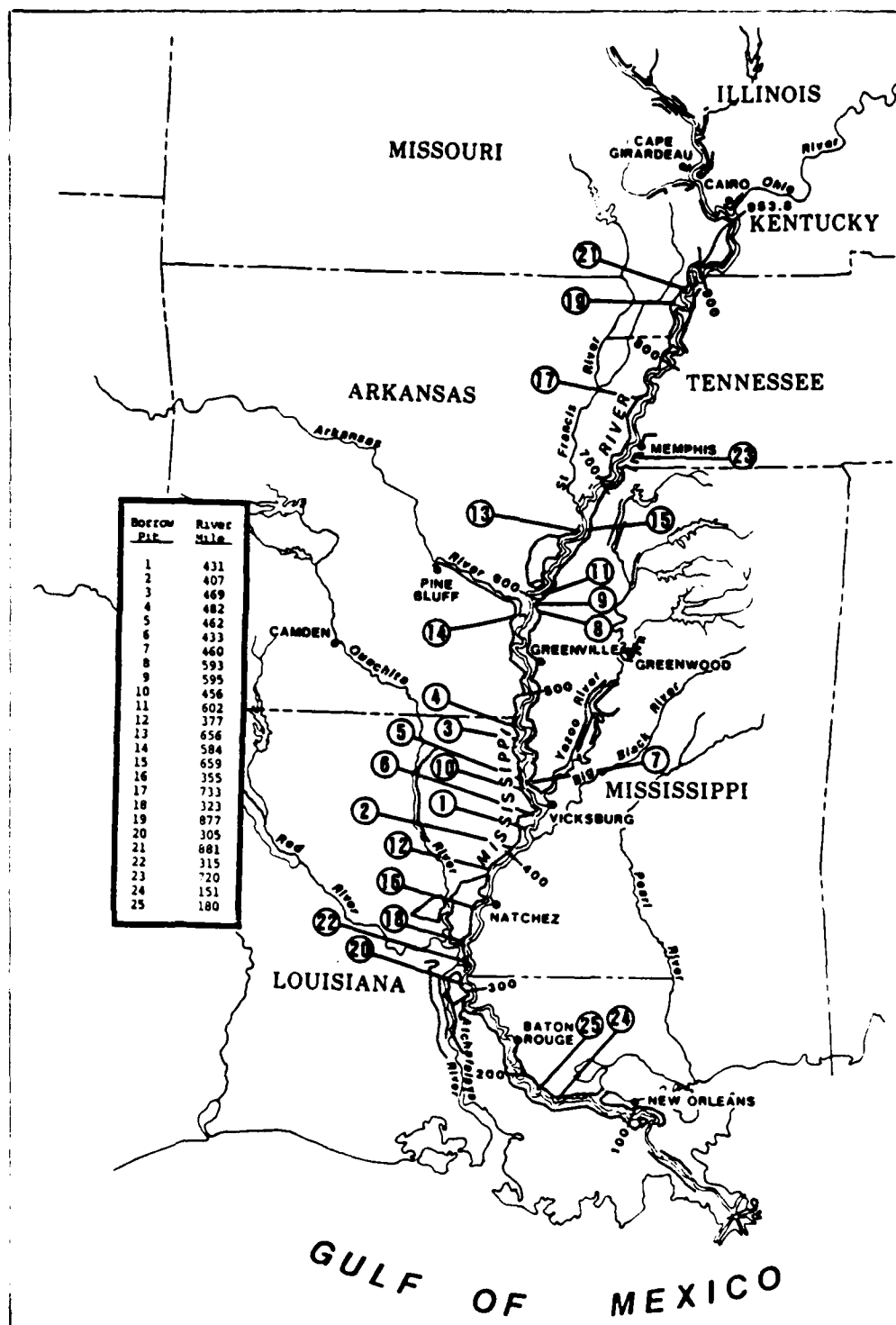


Figure 1. Schematic drawing of the main stem levee system along the Lower Mississippi River showing the locations of the 26 levee borrow pits investigated. (Circle 20 represents the locations of BP20a and BP20b, which are less than 1 mile apart)

hunting, trapping, farming, livestock grazing, and a number of other less frequent uses. Borrow pits are not distributed evenly along the levees. They are concentrated in the central portion of the river between Lake Providence, La. (RM 500), and Old River, La. (RM 300). This 200-mile stretch contains approximately 70 percent of the existing borrow pits in the lower river (Cobb et al. 1984).

12. Borrow pits are generally rectangular in shape, have a gently sloping bottom, shallow depths, and range in size from 1 acre to over 100 acres. However, along the lower river, borrow pits vary and sometimes differ greatly from this typical description. They may also consist of a number of compartments of varying depths and configurations; contain islands; and differ widely in vegetation, surrounding land uses, and distance from the river channel. As part of the LMREP, topographic and morphometric studies were conducted of 25 selected borrow pits and compartments of borrow pit complexes (Buglewitz 1985, Cobb et al. 1984). Sizes within pit banks ranged from 3.3 to 53.4 acres and averaged 19.2 acres. Mean depths at bankfull in the 25 borrow pits varied from 0.54 to 7.16 feet and averaged 3.12 feet. Borrow pit volume of these 25 pits averaged 109,040 cubic yards and ranged from 4,056 to 348,228 cubic yards. Average annual days that these 25 borrow pits were inundated by river floodwaters varied from 24 to 117 days and averaged 81.3 days. A detailed discussion of borrow pit physical, morphometric, and hydrologic features is contained in Buglewitz (1985). A detailed discussion of the fisheries use of borrow pits is contained in Cobb et al. (1984). Figures 2 and 3 show typical borrow pits along the levee system.

13. Vegetation in and surrounding the study area borrow pits consists predominantly of species that can tolerate the wet and flooded conditions of the river floodplain inside the levees. However, due to the closeness of the levee and its "upland" conditions, as well as to the introduction of a number of exotic pasture grasses, weedy species, and commercially harvested crops, plant species around the pits are not necessarily characteristic of native, riparian, bottomland hardwood, or freshwater marsh communities. Rather, the vegetation is generally indicative of edge, transition, or disturbed communities on the shorelines of most pits (Landin 1985), with stands of bottomland hardwoods most often found between the pit and the river. This is especially true where pits are located some distance from the river.



Figure 2. Aerial view of a typical borrow pit along the Lower Mississippi River (BP1)



Figure 3. Levee view of a typical borrow pit along the Lower Mississippi River (BP16)

PART II: METHODS AND MATERIALS

14. Twenty-six borrow pits were selected by the USAED, Vicksburg; the USAE Division, Lower Mississippi Valley; and the WES (Figure 1) and were within the reaches of the Lower Mississippi River from RM 151 in St. James Parish, La., to RM 881 in New Madrid County, Mo. The borrow pits were adjacent to and inside the main stem levees, ranged from 300 feet to 6.3 miles from the river, and were selected based on evaluation of physical characteristics of 213 borrow areas accessible for wildlife research.

15. Observations of bird and mammal use were made over a 2-year period at each borrow pit during the months of December-January, March-April, June-July, and September-October (eight visits per pit). At each borrow pit, systematic observations were recorded from preselected points (both diurnally and nocturnally) along floating-belt transects,* and within circular plots located at least 30 yards away from the shoreline and outside the transects. Data were collected according to the schedule shown in Table 1. Visits at each borrow pit were coordinated with previous observation dates as closely as weather permitted. As the timetable permitted, observations were made on clear to partly cloudy days with no rainfall since rainfall was thought to significantly alter animal movements and signs. Techniques included bird call counts; visual mammal and bird counts; vegetation measurements on transects; and recording the occurrence and abundance of known wildlife foods (primarily vegetation), browse utilization, den and nest counts, and animal signs such as scats, rubbings, territorial indicators, tracks, burrows, runs, and slides. These techniques were generally taken from Burt and Grossenheider (1964), Murie (1974), Schemnitz (1980), and Yoakum et al. (1980). All observations were made by Landin (1985). Identification of species was based on DeBenedictis (1983), Lowery (1981), Murie (1974), and Scott (1983).

* Floating-belt transects refer to 30- by 300-yard transects that were variably located around the borrow pits depending upon the fluctuating water levels along the shoreline of the pit.

General Observations

16. A general observation point, usually atop the river levee, was selected at each borrow pit for the best view. Observations using 7 × 50 binoculars and spotting scope were made for 4.5 hours each day (see Table 1). Exceptions were made at the largest borrow pit, where two observation points were established, and bankside points were established on two other pits because of dense vegetation between the pit and the levee. Numbers and species of all mammals and birds observed during each observation period were recorded. Nocturnal observations were made from the same point by periodic coverage of the borrow pit area with a vehicular battery-charged spotlight and binoculars.

17. Most observations made from the established observation point(s) were conducted from a car on the levee. Observations were made from both inside and outside the car. Animals seemed to pay little attention to the observation vehicle. Where it was not possible to use observation points on the levee, and vehicular access was not permitted, observations were made from a blind made of natural vegetation on levee berm roads.

Birds

18. Two methods for determining bird use of the borrow pits were used. Observations were recorded according to the schedule in Table 1 from the established observation point(s) at each borrow pit. In addition, a central line along the same transect used for mammal observations was followed, and birds of the brush, shore, and marsh that were not readily seen from the established observation point(s) were noted. Binoculars were used and the observer stopped at intervals of 25 yards for 2 to 3 minutes to listen for bird calls that might otherwise have been missed. All observations were made at approximately the same time of day at each borrow pit. Established point observations varied according to seasonal daylight hours, but transect observations were conducted at approximately the same time of day regardless of season. Calls by the observer were used to flush birds from cover so they could be identified and counted. Nesting data were collected during the spring/summer sampling periods, and all observations of nests in the borrow

pit complexes* were counted. Nests were found primarily along transects, but colonies and other conspicuous nests were noted from the general observation points.

Mammals

19. Mammal use of the borrow pits was determined by three methods. Observations from the established observation point(s) were made according to the schedule in Table 1. Tracks, scats, and other animal signs were counted on one to four 30- by 300-yard belt transects at each pit visit. Since the transects fluctuated with water level, they were often different at each visit. The line of walk was along the shoreline, with note made of any animal sign visible within the 30-yard zone. Four randomly selected points spaced at least 50 yards apart and at least 30 yards from the shore were selected leading off each of the transects. Around each selected point, all animal signs within a 10-yard-diameter circular plot were recorded. No attempt to examine individual mammal health or conditions, or to determine breeding or reproduction, was made within this study.

Data Analysis

20. Observations collected were of species and numbers within species of birds and mammals within each group listed below, and total numbers of all birds and mammals within each group. (An observation equals one sighting of one animal within one species.) Bird groups were waterbirds (wading and diving); waterfowl (dabbling and diving); shorebirds; seabirds; raptors, owls, and vultures; upland gamebirds; nonperching land birds; and perching land birds. Mammals were placed in furbearer, nongame, game, and domestic categories. Bird species were grouped according to seven general nesting habitats of the birds found: cavity nesters, colony nesters, other tree nesters, shrub nesters, levee nesters, other ground nesters, and others.

* A borrow pit complex is defined in this study as a series of interconnected pools of water separated only by an island or by a partial berm, such as BP11, BP12, and BP16.

21. Waterbirds, waterfowl, shorebirds, seabirds, woodpeckers, swallow, and some mammal species were selected for statistical analysis as part of the LMREP, since these species were all considered by the MRC to be water associated to some extent or to utilize snags within or adjacent to the borrow pits. A median one-way analysis (Chi Square approximation) was conducted on these groups, and borrow pits were ranked according to numbers of observed wildlife using each pit.* Pits in which group observations were larger than the 50th quartile (grand median) were considered significantly different ($P < 0.0001$) from those which were smaller than the grand median.

22. Individual borrow pit shoreline development indices (SDI) (Cobb et al. 1984) were calculated from shoreline lengths and pool areas at bankfull:

$$SDI = \frac{SL}{3.5A}$$

where

SL = shoreline length, feet

A = surface area, square feet

Correlation analyses were computed between the various wildlife groups and the SDI to determine broad differences in bird utilization among borrow pits. Data from all eight sampling periods were combined to compute quartile points for each group in each borrow pit; a grand median for all borrow pits was also calculated for each group.

PART III: RESULTS AND DISCUSSION

23. During the 2-year study, 209 wild species were observed, with a total of 271,931 animals seen. An average of 10,459 observations per borrow pit and 1,307 observations per season were made. These averages do not reflect the seasonal fluctuation of borrow pit wildlife use, nor account for migration, winter visitation, or summer residency differences. Twenty-three wild mammal and 186 bird species were observed over the eight sampling periods; 67 bird species were found nesting in borrow pit habitats.* Observations of birds and mammals per borrow pit per season, with totals, means, and maximums, are presented in Table 2. More detailed technical information and data analyses on the entire study, including examination of borrow pit environmental and physical characteristics, individual wildlife species, and vegetation in borrow pit habitats, are presented in Landin (1985).

24. The 186 bird species observed represent every major avian group except pelagic birds and every life activity of North American birds including year-round residents, summer (breeding) residents, migratory birds, and winter visitors. Perching land birds (songbirds) comprised 50 percent (93 species) of all bird species observed and 94 percent of all bird observations. Numbers of species for other groups of birds were much lower: waterbirds, 8.1 percent (15 species); waterfowl, 9.1 percent (17 species); shorebirds, 9.1 percent (17 species); seabirds, 3.8 percent (7 species); raptors, 9.1 percent (17 species); upland gamebirds, 2.2 percent (4 species); and nonperching land birds, 8.6 percent (16 species). Birds were by far the most abundant wildlife in borrow pit habitats, making up 99 percent of all wild species observed.

Waterbirds

25. Fifteen waterbird species were found over the 2-year study, with a total of 4,475 individuals observed. These species were the American bittern, anhinga, black-crowned night heron, cattle egret, common loon, double-crested cormorant, great blue heron, great egret, green-backed heron, little blue

* A borrow pit habitat is defined as any habitat within the 30-yard range of influence of the pit, i.e., both the area within the pit (the water) and on the shoreline.

heron, pied-billed grebe, snowy egret, white ibis, wood stork, and yellow-crowned night heron.

Wading birds

26. Ten species of long-legged waders were observed during the study. Great blue herons and especially great egrets were very common throughout the borrow pit areas from southern Louisiana to southern Missouri. Both species were found feeding in borrow pit habitats nearly year-round. In cold months (December-March), they generally moved south of the study area (Scott 1983); however, they were observed in southern Louisiana in lower numbers in winter.

27. Several large mixed nesting colonies of herons and egrets between the levees were observed incidental to borrow pit data collection. There are probably other colonies that were not located. The observed colonies were located near Plum Point, Tenn. (RM 775); Fort Adams, Miss. (RM 323); Cottonwood Bar (RM 466), Yucatan Bend (RM 406), and Davis Island (RM 420), La.; and in BP23 (RM 721) in Shelby County, Tenn. Other colonies were reported by local citizens to be on Vice-President's Island (RM 728) between BP23 and the city of Memphis.

28. Great blue herons, great egrets, little blue herons, and snowy egrets concentrated at drying borrow pit pools to feed where fish populations were concentrated. Large groups of ten to a hundred great blue herons and great egrets could be seen in shallow pools along the levee system in dry months, feeding until both water and fish were gone. Because of these feeding habits, changes in pit characteristics such as vegetation seemed to make little difference in numbers observed. However, use seemed much greater for great egrets where intensive grazing occurred, the pits had permanent water pools, and the pits were closer to the river. Great blue herons indicated no strong habitat preferences and occurred regardless of pit characteristics.

29. Little blue herons and snowy egrets were fairly common. They were usually seen feeding singly in borrow pit areas, both in drying shallow pools and in the edges of deeper pools regardless of river stage. Greenbacked herons were commonly seen at all borrow pits in summer. Individual nests were found at several borrow pits in dense vegetation, and they also nested in mixed colonies with other herons and egrets.

30. Wood storks, a declining and rare species throughout their range, were observed during fall migration at numerous pits along the river, and birds were seen at other borrow pits in the study area as early as July in

1983. Wood storks were counted only at the 26 borrow pits included in this study, but at one nonstudy borrow pit north of Waterproof, La. (RM 381), over 100 storks were observed feeding in one drying pool. Wood storks were not found at borrow pits during spring migration although they spend their summers on the White River in Arkansas and their winters in the Everglades in Florida where they nest (Scott 1983).

31. Occasionally, black-crowned and yellow-crowned night herons were seen feeding in borrow pits, and both species nested at BP23. White ibises were observed feeding in small groups on mudflats and in shallow water during summer and fall at five borrow pits.

32. Nine of these species (all but white ibis) were grouped and statistically analyzed (1,488 observations). Figure 4 shows this group of wading birds by individual pit in comparison to a composite of the 26 borrow pits using the median test. BP1, BP2, BP3, BP4, BP5, BP6, BP10, BP12, BP14, BP15, BP16, BP17, and BP23 had significantly greater use by these nine species ($P < 0.0001$) than the remaining 13 pits. The greatest numbers of observations were for BP1, BP3, BP4, and BP12. These pits were different in size, configuration, and surrounding habitats. BP3 was a very shallow new pit which dried out both years. Wading birds fed in the borrow pit pools until the water was gone. BP1 and BP2 had islands and berms throughout the pit area, and both shallow- and deep-water feeding areas. BP4 had a shallow area on the west end of the pool that received considerable use as the borrow pit dried out in late summer. The four borrow pits with the greatest wading bird use were located within a few miles of large waterbird nesting colonies, as was BP10. BP23 had a colony nesting within the borrow pit.

33. In general, the 13 borrow pits that received the greatest use had both shallow- and deep-water areas. Also, these pits generally had a mixture of open pastures and woody vegetation around them, with the exceptions of BP3 and BP20b (which were completely open and periodically dried out), BP23 (which was completely wooded and had a nesting colony), and BP5 (which had large stands of trees but dried out completely).

Diving birds

34. Four species of waterbirds observed generally tend to feed in deeper pools. These were the pied-billed grebe, anhinga, common loon, and cormorant. Anhingas and double-crested cormorants were commonly found in

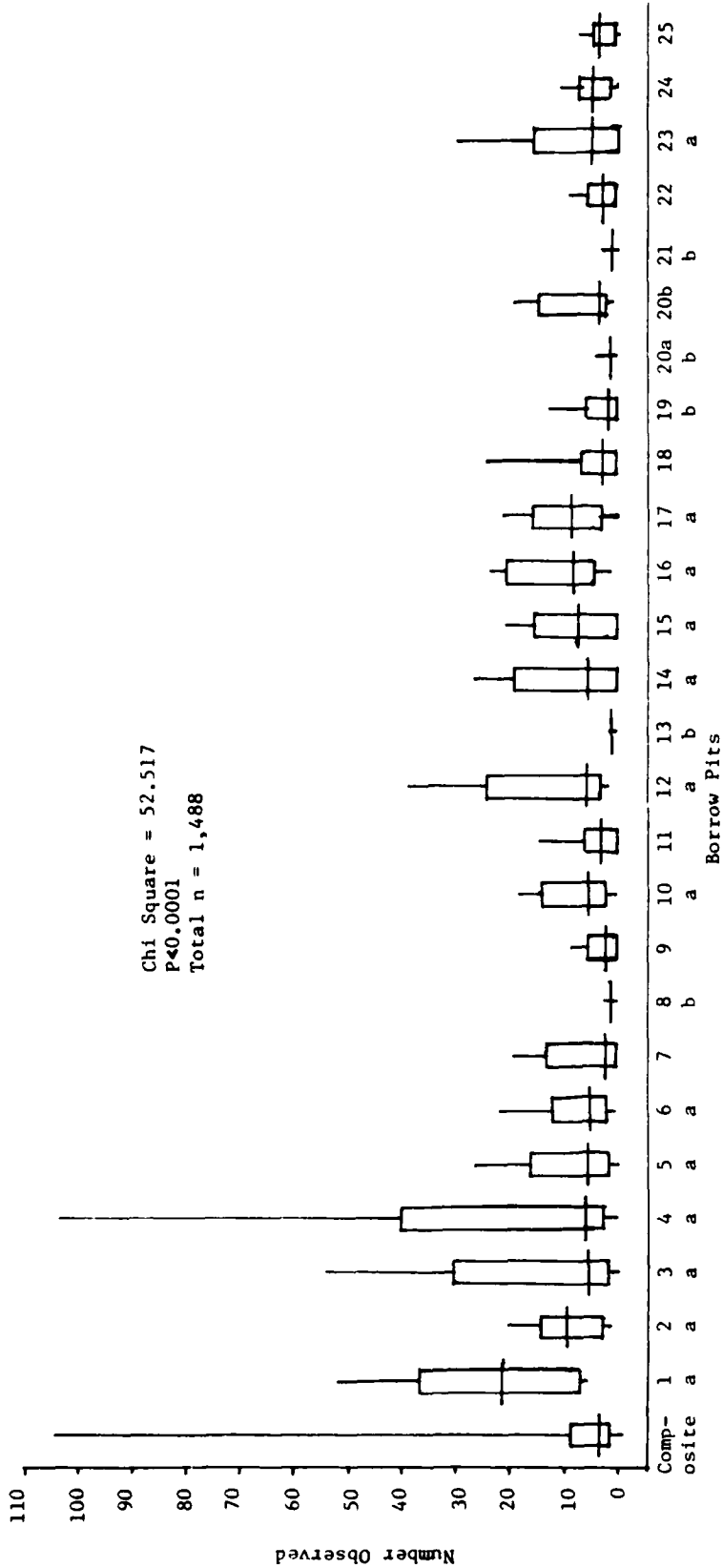


Figure 4. Relationships between the 26 borrow pits and numbers observed of nine wading bird species (great blue heron, great egret, snowy egret, black-crowned night heron, yellow-crowned night heron, wood stork, little blue heron, green-backed heron, and American bittern). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of a composite of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

borrow pit pools with permanent water during periods of high river stages or when pools were filled to capacity. The cormorants usually moved in groups from pool to pool and swam in the pools or perched together on dead snags. Cormorants nested near the river close to BP18 in 1982 but were not found there in 1983. Anhingas fished alone or in pairs and were often seen sunning on low perches over permanent water pools in summer. They also nested at two borrow pits (Table 3).

35. Use by loons and grebes was rare to incidental, although pied-billed grebes were regular winter visitors and one pair nested at BP18 in southern Louisiana. The four species, along with American coots, were grouped and statistically analyzed. Figure 5 shows this group of birds by individual pit in comparison to a composite of the 26 pits using the median test. BP1, BP2, BP4, BP6, BP11, BP16, BP18, BP20a, BP20b, and BP23 had significantly greater use by these five species ($P < 0.0001$) than the remaining 16 pits. The greatest numbers of observations were at BP1, BP16, and BP18, where double-crested cormorant flocks occurred, and at BP23 where American coots flocked in winter. None of these species was observed at BP8, BP14, BP15, BP19, BP21, BP22, and BP24 during the 2-year study.

36. BP2, BP4, BP6, BP11, BP20a, and BP20b had fairly regular use by anhingas in spring and summer and by grebes in winter. These borrow pits were not deep, but flocking and the greatest use by all the species but American coots occurred while the river stages were high and flooding occurred in borrow pits or when the pools were still at bankfull. All 10 borrow pits with greatest use were surrounded by wooded habitat except BP16 and BP20b, and all 10 had dead snags and floating debris that the anhingas and double-crested cormorants used as perches.

Cattle egret

37. The most common waterbird found at the 26 borrow pits was the cattle egret; a total of 2,209 were observed. This waterbird species is taxonomically classified as a long-legged wader but generally is separated from the other species by feeding habits. Such heavy use by cattle egrets was primarily a result of the extensive use of land surrounding borrow pits for livestock pasture. Cattle egrets frequented the water's edge and roosted in borrow pit trees while cattle were not actively grazing. They were present in summer wherever cattle were pastured. In the mild winter of 1982-1983, they

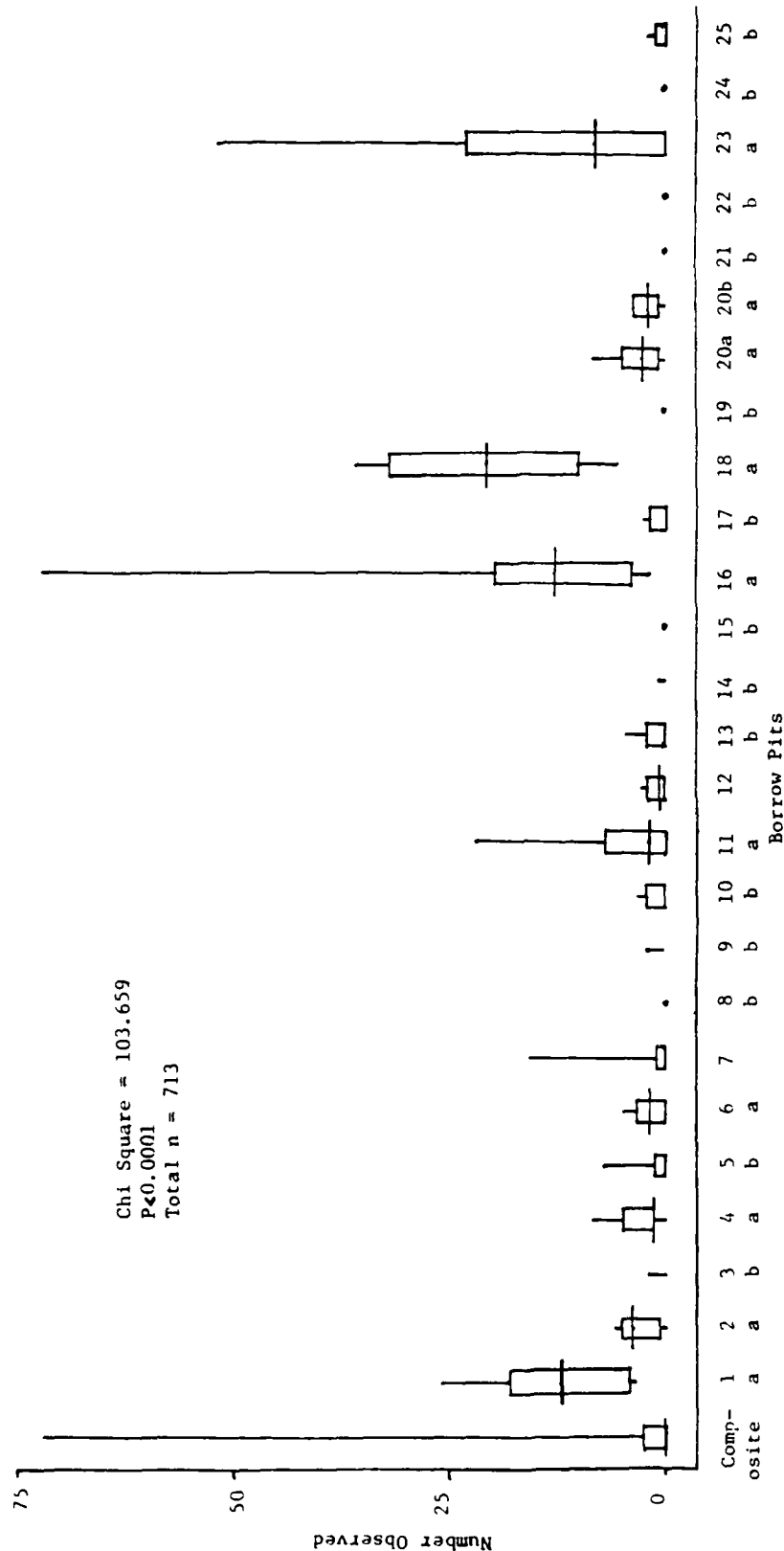


Figure 5. Relationships between the 26 borrow pits and numbers observed of five diving bird species (American coot, pied-billed grebe, anhinga, double-crested cormorant, and common loon). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. No diving birds were found at BP's 8, 14, 15, 19, 21, 22, and 24. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of a composite of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

remained year-round as far north as Lake Providence, La. Although cattle egrets do not feed in water, they use wet habitats, eat shoreline animals such as crayfish and frogs, nest in wetlands, and are considered wading birds (Sprunt, Ogden, and Winckler 1978).

Waterfowl

38. Sixteen waterfowl species were found during the 2-year study, with a total of 2,529 individuals observed. Species present were the American black duck, American wigeon, blue-winged teal, bufflehead, canvasback, gadwall, green-winged teal, hooded merganser, lesser scaup, mallard, northern pintail, northern shoveler, redhead, ring-necked duck, ruddy duck, and wood duck. No geese were observed at any of the 26 borrow pits, although they were observed flying over study pits and have been found at other borrow pits in the Lower Mississippi River Valley.

Dabbling ducks

39. Nine species of waterfowl that generally feed in less than 2 feet of water were observed during the study. Overwintering ducks, especially mallards, use the lower Mississippi River floodplain and its tributaries.* Although very large numbers of ducks were observed from the main stem levee in fields in southern Louisiana and in Arkansas, very few of these birds came over the levee into the borrow pits. They were feeding in harvested rice and soybean fields, and returned to such areas as the White River National Wildlife Refuge (NWR) and the Catahoula Lake NWR to rest.

40. Borrow pit use by duck species was not high at any time of the year. Small numbers of birds, primarily blue-winged teal and mallards, stopped at pits during migration. In general, vegetation type around borrow pits seemed unrelated to migrating mallards, while blue-winged teal seemed to prefer pits with more open habitats around pits.

41. Wood ducks showed a very high preference for borrow pits with wooded habitats such as bottomland hardwoods. Wood ducks occurred at almost all study borrow pits, and hens and broods were observed at several of these

* Personal Communication, 1982, Ken Reinecke, US Fish and Wildlife Service, Vicksburg, Miss.

pits in 1982. A few nested in 1983, but high water probably decreased their brood-raising success. The land between the levees apparently provides adequate wood duck habitat, and both year-round and winter use occur. The study borrow pits, however, provided only fair brood habitat due to several factors--prolonged flooding, rapidly fluctuating water depths, and lack of cover and food. Most cavities found around borrow pits were in snags too small for wood ducks, so natural nest site availability probably played a role in the number of wood ducks using the borrow pits in spring and summer.

42. Seven of these species (American black duck, American wigeon, blue-winged teal, mallard, northern pintail, northern shoveler, and wood duck) were grouped for statistical analysis. Figure 6 shows this group of ducks by individual pit in comparison to a composite of the 26 pits using the median test. BP1, BP2, BP3, BP4, BP6, BP9, BP11, BP14, BP16, BP17, BP18, BP20a, and BP23 had significantly greater use by these seven species ($P < 0.0001$) than the remaining 13 pits.

43. The greatest numbers of these species were observed in BP1, BP3, BP9, BP14, BP17, and BP23. No dabbling ducks were found at BP24 and BP25. BP14 and BP23 had very high use, which was probably related to both their locations in the river system and the surrounding habitat. BP14 is near the mouth of the White River, a tributary of the Mississippi, and the site of the White River NWR. Large overwintering populations of ducks, especially mallards, occur there each year. BP23 is located adjacent to Cacklebur and Horn Lakes, both of which are heavily utilized by migrating and overwintering ducks. Both pits are protected by hunting clubs, and so are BP1 and BP9. The six pits with highest dabbling duck use have little or no livestock grazing around them, and none were close to the main river channel. With the exception of BP3 and BP16, the 13 pits were generally bordered by bottomland hardwoods or stands of willows and cottonwoods. They also offered habitat diversity because dense woods were interspersed with patches of more open woodland and/or open fields.

Diving ducks

44. Five waterfowl species (hooded merganser, lesser scaup, canvasback, ring-necked duck, and bufflehead) which generally prefer deeper pools than the previously discussed seven waterfowl species were grouped and analyzed. No significantly different pits were found in this grouping, and no diving ducks

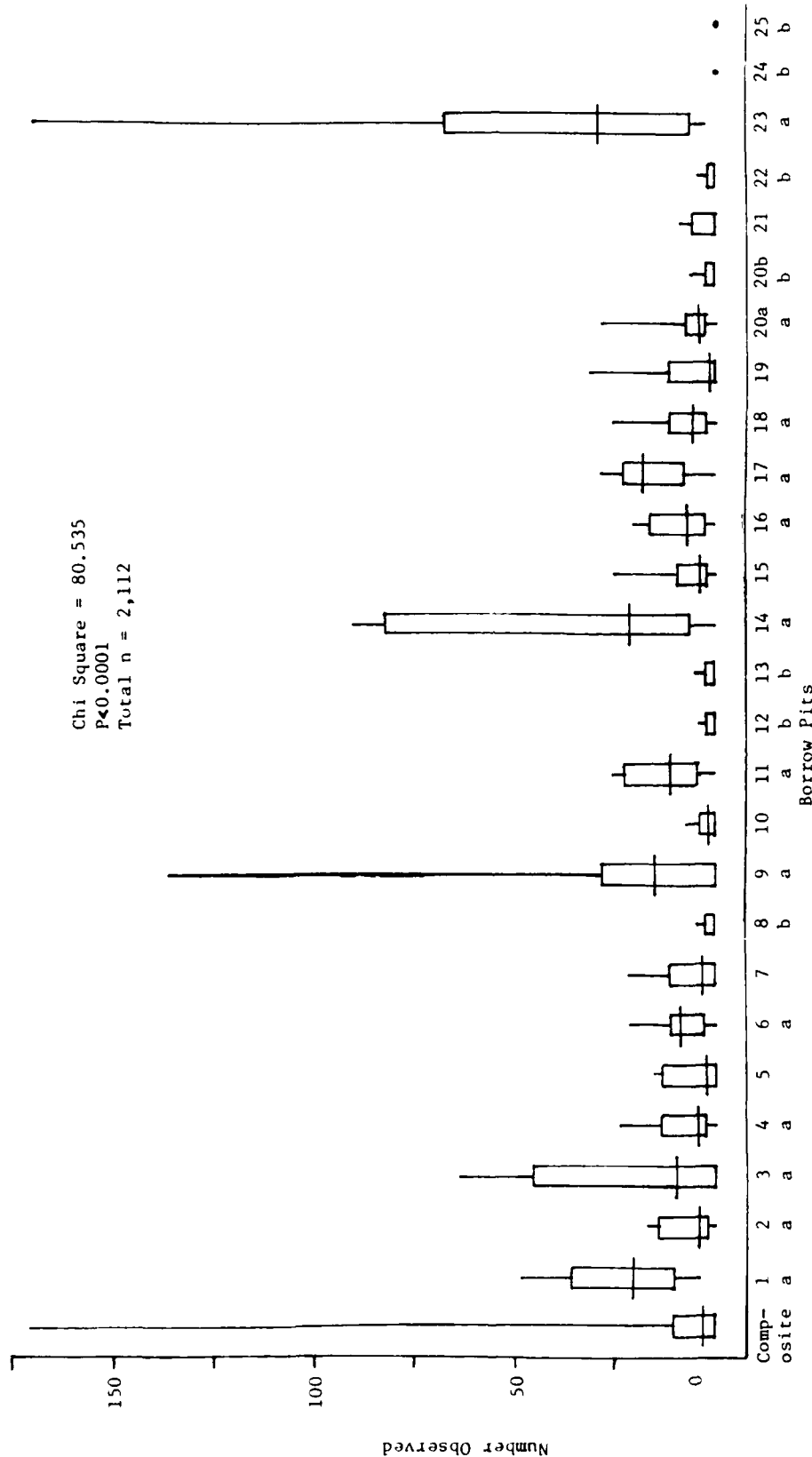


Figure 6. Relationships between the 26 borrow pits and numbers observed of seven dabbling duck species (mallard, northern shoveler, wood duck, blue-winged teal, American black duck, American wigeon, and northern pintail). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. No dabbling duck species were found at BP's 24 and 25. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of a composite of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

were found at BP4, BP5, BP7, BP8, BP13, BP15, BP17, BP19, BP20a, BP20b, BP21, BP22, and BP25. BP16 and BP23 had 93 of the total 179 observations for this group. BP23 was within a protected, heavily utilized waterfowl area around two natural riverine lakes; BP16 had a series of permanent water pools, was near Catahoula Lake NWR, and received some migratory duck use. The two pits were totally different in size, vegetation, and surrounding land use. BP23 was small, surrounded by bottomland hardwoods, and was protected by a hunting club; BP16 was a large, open, intensely grazed area with 10 pool compartments separated by berms that had been breached.

Shorebirds

45. Seventeen shorebird species were found over the 2-year study, with 1,777 individuals observed. Species seen were the black-bellied plover, black-necked stilt, common snipe, greater yellowlegs, killdeer, least sandpiper, lesser golden-plover, lesser yellowlegs, long-billed dowitcher, piping plover, red knot, semipalmated plover, short-billed dowitcher, solitary sandpiper, spotted sandpiper, upland sandpiper, and willet.

46. The three characteristics of borrow pits that seemed to be very important to shorebirds were the absence of vegetation (i.e., open habitats where large expanses of drying mudflats occurred), high-intensity livestock grazing, and shallow pool depths. This was especially true for killdeers and least sandpipers. Killdeers were universally present at borrow pits and occurred on levees, mudflats, and open pastures throughout the study area. They also frequently nested on high, bare areas at borrow pits in 1982 and on levees in 1983.

47. In general, all shorebird use, except by killdeers, was during migration or as winter visitors and probably occurred to a greater extent than Table 2 indicates. Shorebirds were heard but barely seen at night during migration and could not be accurately counted. They used the area between the levees as a migratory corridor. All species were more commonly seen during fall migration where they fed around edges of drying pools and on the mudflats in borrow pits. Spotted sandpipers, least sandpipers, and common snipe were also found in winter. The least sandpipers occurred in small groups, while the spotted sandpipers and common snipe were found singly.

48. Shorebird species, with the exception of lesser golden-plover, were grouped for statistical analysis. Figure 7 shows this group of shorebirds by individual pit in comparison to a composite of the 26 pits using the median test. BP1, BP3, BP13, BP14, BP16, BP17, BP19, and BP20b had significantly greater use by these 16 species than the remaining 18 pits ($P < 0.0001$). The greatest numbers of observations were for BP3, BP13, and BP16. These pits all had one dominant characteristic in common--they were all very open habitats surrounded by pastures. BP13 and BP16 were older pits surrounded by lands intensely grazed by livestock (up to 10 head/acre), and BP3 was newly built with only bare ground habitat and herbaceous cover during the study. These three pits were also very close to the main river channel. All eight pits with highest use were generally diverse in habitat, with both shallow- and deep-water pool areas.

Other Bird Species

Seabirds

49. Seven species of seabirds (gulls and terns) were seen occasionally on borrow pits close to the river (116 individuals observed). However, seabird use was minor, and no differences were detected in habitat selection other than closeness to the river. No statistical analysis were made for these species. One group of six Caspian terns was observed on a muddy berm at BP1. Herring, laughing, and ring-billed (winter only) gulls were commonly seen over the river and occasionally over flooded borrow pits. Common, Forster's, and interior least terns were seen in migration in small numbers. Small numbers of immature laughing gulls occurred year-round in southern Louisiana. None of these species normally frequent borrow pit habitats. Only when river levels were high and borrow pits were flooded did tern species occur at all, and generally then only at borrow pits that had no trees and were very close to the river.

Raptors, owls, and vultures

50. Seventeen species of raptors, owls, and vultures were seen in borrow pit habitats (1,245 individuals observed), but no statistical analysis was made for this group. These species were grouped together because of their position at the top of the food chain and because they are all flesh and/or carrion eaters. Three species commonly occur in wetland areas--the

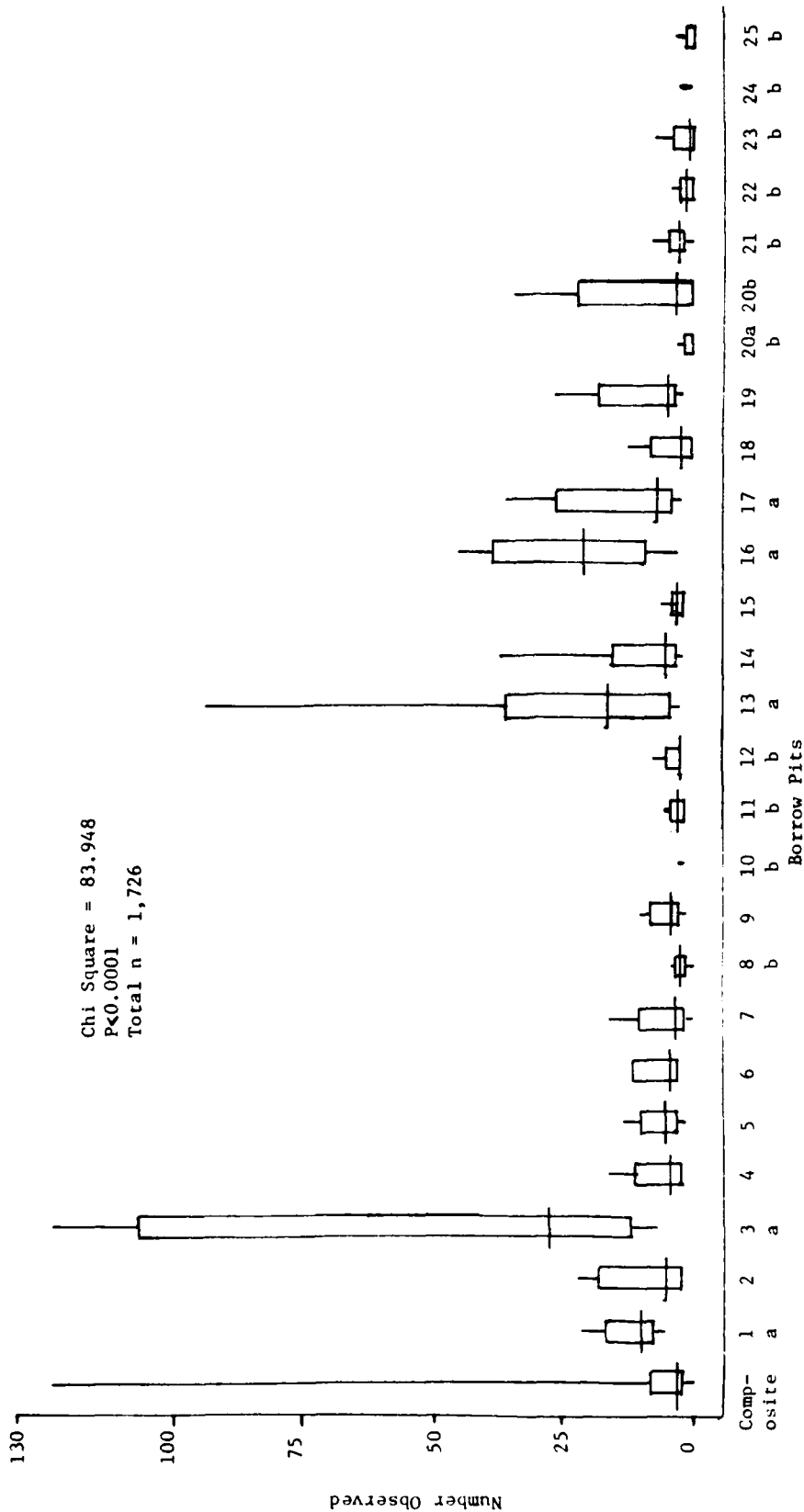


Figure 7. Relationships between the 26 borrow pits and numbers observed of 16 shorebird species (common snipe, killdeer, least sandpiper, solitary sandpiper, long-billed dowitcher, short-billed dowitcher, upland sandpiper, black-bellied plover, greater yellowlegs, lesser yellowlegs, spotted sandpiper, willet, red knot, semipalmated plover, black-necked stilt, and piping plover). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of a composite of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

Mississippi kite, northern harrier, and barred owl. Their occurrence did not seem to be related to pit location or habitat characteristics. However, barred owls seemed to prefer permanent pools and wooded habitats, while northern harriers seemed to prefer open habitats around pits. All of the 17 species occurred throughout the leveed floodplain.

51. Hawks, especially red-tailed hawks, northern harriers, and American kestrels, were common at borrow pit sites, especially in winter. Kestrels and red-tailed hawks occurred at all pits, and red-shouldered hawks were found at all pits with wooded habitats. Broad-winged hawks migrated through the bottomland hardwoods inside the levees in large numbers and were found at borrow pits in Arkansas, Mississippi, and Louisiana.

52. Mississippi kites were common in summer months and nested in tall trees anywhere they were available along the river. Kettles* of up to 50 kites could be seen over the river and islands in the fall. Bald eagles and ospreys occasionally were seen in winter along the river lakes and sloughs. However, only one eagle and one osprey were found at the study pits.

53. Barred owls, great horned owls, and eastern screech-owls are residents of bottomland hardwoods, but since they are nocturnal, they were not observed nor heard as frequently around borrow pits as they probably occurred. Barn owls were found with even less regularity. These owl species were seen on a year-round basis at most study borrow pits. Black and turkey vultures were generally seen only in association with livestock, where they were occasionally seen feeding on carcasses of cattle around borrow pits and on levees. While black vultures nest on the ground in bottomland hardwood habitats, none were found around the pits in this study.

Upland gamebirds

54. Four species of birds generally classified as upland gamebirds (Johnsgard 1975) were found around the borrow pits (1,620 individuals observed). These were the American woodcock, wild turkey, mourning dove, and northern bobwhite. Since these species were not primarily associated with aquatic habitats, no statistical analysis was made.

55. Woodcocks occurred in very low numbers (24 observations). Wild turkey flocks were seen especially in the Mississippi Delta, and singles and

* Kettles are large numbers of raptors in flight during migration.

pairs of gobblers were both heard and seen at borrow pits during the study (128 observations). Coveys of northern bobwhites occurred around some borrow pits during low-water stages (381 observations). Apparently, the bobwhites used natural food and cover at pits inside the levees but moved across the levee out of floodwater conditions.

56. Mourning doves were very common year-round and made up 1,087 (67 percent) of the total observations for this group. Doves fed in and around borrow pit pools and on levees, and nested in borrow pit trees. They were more abundant during migration and in winter months and were found at every borrow pit but BP20a, a small, ungrazed, densely wooded borrow pit in southern Louisiana.

Woodpeckers

57. The seven woodpecker species found around borrow pits were the most numerous of the nonperching land birds generally associated by taxonomic characteristics (2,951 individuals observed). They included the red-headed woodpecker, red-bellied woodpecker, hairy woodpecker, downy woodpecker, pileated woodpecker, northern flicker, and yellow-bellied sapsucker. Without exception, the woodpecker species occurred in higher numbers in bottomland hardwood, moderately grazed borrow pit habitats with permanent water pools. Borrow pit size, distance from the river, and flooding duration seemed unrelated to use by these cavity-nesting species. Red-headed and red-bellied woodpeckers were very common at all borrow pits with trees in and around them; all woodpecker species used black willows (dead and alive). Pileated woodpeckers were also quite common at the more wooded borrow pits, but were also seen in open habitats. Northern flickers seemed to prefer more open areas but were found at all 26 borrow pits. During migration and in winter months, flickers were observed in loose flocks of up to 25 birds.

58. The seven woodpecker species were statistically analyzed as a group (Figure 8). BP1, BP2, BP4, BP5, BP7, BP11, BP14, BP15, BP17, BP22, BP23, and BP25 had significantly greater use by these seven species than the remaining 14 pits ($P < 0.0001$). The greatest numbers of observations were for BP1, BP4, BP7, BP11, and BP23. All of these borrow pits had large wooded areas partially or completely surrounding the borrow pit, and all had a large number of snag trees present in and around the borrow pits. All 12 of the pits where woodpeckers were most numerous had similar surrounding habitats. In general,

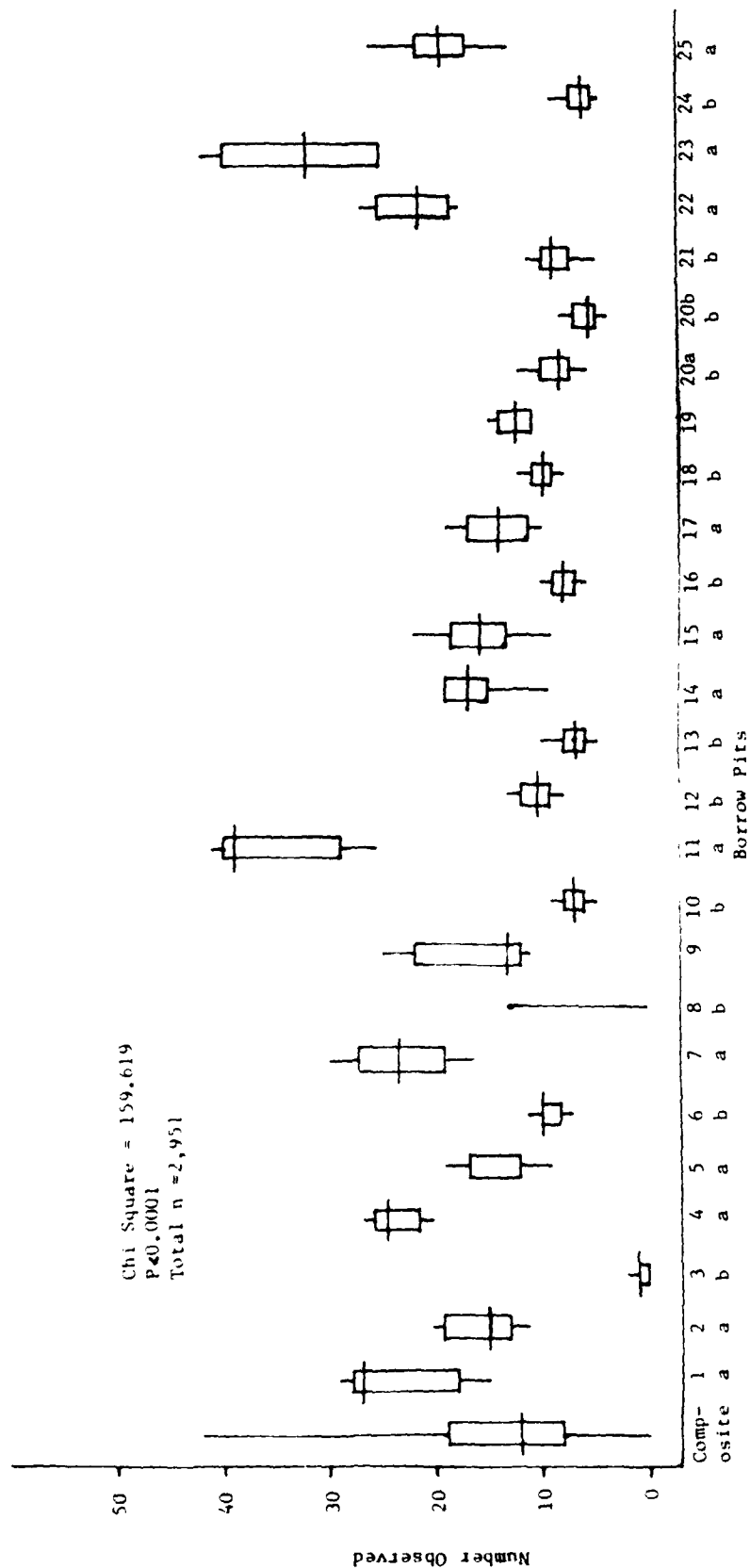


Figure 8. Relationships between the 26 borrow pits and numbers observed of seven woodpecker species (red-headed woodpecker, red-bellied woodpecker, pileated woodpecker, yellow-bellied sapsucker, northern flicker, hairy woodpecker, and downy woodpecker). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of a composite of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

the borrow pits that were smaller, more open, or heavily grazed had much less use by woodpeckers.

Other nonperching land birds

59. Nine species of other nonperching species were found around borrow pits during the study (839 individuals observed). Belted kingfishers occurred at 24 borrow pits, and were more common in winter months. They indicated no important habitat preferences except for larger pools of permanent water.

60. Yellow-billed cuckoos were very common in summer and nested within nearly every borrow pit complex. They were present in larger numbers in bottomland hardwoods and willow habitats with permanent water pools, away from the river, and at pits that seldom flooded. Other species observed from this group were common nighthawks, black-billed cuckoos, greater roadrunners,* chimney swifts, rock doves, ruby-throated hummingbirds, and budgerigars.*

Songbirds (perching land birds)

61. Ninety-three species of songbirds were found at the borrow pits. Fifty percent of all bird species observed and 94 percent of all individual bird observations were songbirds. Various species of songbirds occurred at all 26 borrow pits.

62. Winter flocks of American robins, cedar waxwings, and white-throated sparrows; winter flocks of five blackbird species; and migratory flocks of four swallow species were so large that usually only estimates could be made of each species. The winter blackbird flocks ranged widely over open fields and pastures and, at night, roosted in trees by the thousands. Large brown-headed cowbird flocks were also found at borrow pits from late summer to spring. Smaller flocks of 10 to 50 birds were seen in early summer when the females were laying eggs.

63. Most of the smaller migrating birds, especially the warbler species, American redstarts, and tanagers, were seen only in the spring and were not surveyed adequately due to the methods chosen for the overall study. Winter and summer birds could be more accurately counted throughout the study area since these birds were not rapidly migrating. Sparrow species,

* These two species were unusual sightings of species introduced to the study area.

especially white-throated, white-crowned, field, swamp, song, and savannah sparrows, were abundant in winter months where shrubs and tall grasses were available around borrow pits for cover. Horned larks occurred year-round north of Memphis, but were very common in small flocks in winter months north of Natchez. Year-round resident northern cardinals, Carolina chickadees, and Carolina wrens frequently flocked with overwintering sparrows, American goldfinches, and yellow-rumped warblers.

64. Summer nesting warblers, eastern wood-peewees, flycatchers, eastern kingbirds, vireos, orioles, and buntings, especially indigo buntings, were quite common. Year-round residents such as northern mockingbirds, northern cardinals, Carolina chickadees, Carolina wrens, tufted titmice, loggerhead shrike, brown thrashers, rufous-sided towhees, and others were generally present throughout borrow pit habitats. They were generally observed at each sampling period even during high water, especially cavity nesters.

65. Purple martins and bank and barn swallows nested in the vicinity of borrow pits and fed over the pools. In Missouri and Arkansas, groups of northern rough-winged swallows were also present. During spring and fall migration, swallows migrated by the thousands, using the Mississippi River and its levees as a migratory corridor. Over the main body of the river during the height of migration, tens of thousands of swallows, especially tree swallows, were within sight at any given time.

Bird species at other borrow pits

66. Twenty bird species that were incidentally observed on borrow pits other than the 26 study pits include: American white pelican, bobolink, Boneparte's gull, brown pelican, Canada goose, common moorhen, dickcissel, eared grebe, lapland longspur, least bittern, marsh wren, ovenbird, palm warbler, purple gallinule, Swainson's thrush, Tennessee warbler, whip-poor-will, willow flycatcher, worm-eating warbler, and yellow-throated vireo. These species are not abundant in the Lower Mississippi River Valley but have been seen during migration or as short-term residents of borrow pit habitats. None are year-round species within the Lower Mississippi River Valley away from the Gulf Coast except Canada geese.

Nesting Bird Use

67. A total of 67 bird species nested within the 26 borrow pit complexes during the 2-year study. These species were divided into groups according to nesting habitats (Table 3). Bird reproduction was noted by the presence of nests, breeding pairs, and/or broods. No attempt was made to determine nesting success through the continued observance of nests or broods once they were located due to the sampling schedule. It is highly likely that some nests at some of the pits were missed. Nest records were not limited to those found in transects, but included any nests, breeding pairs, and broods found anywhere at each borrow pit.

Cavity nesters

68. Seventeen species of birds that nest in cavities in snags, stumps, and sometimes living trees were observed nesting at the borrow pits. Cavity nesters were the most important group; snag habitat was abundant around all but the most open borrow pits, and at some pits such as BP1, BP7, BP11, BP15, and BP23, cavity nesters were the most common nesting birds observed. Two species, great-crested flycatchers and prothonotary warblers, were summer residents only. The other 15 species lived year-round at the borrow pits and occupied the cavities in which they nested throughout the year.

69. Most snags were dead or dying black willows, eastern cottonwoods, or American sycamores. How long a snag tree persists is not known, but new pits such as BP20b and BP3 had few snag trees. Since most willows grow from seeds after each pit is constructed, and black willows are fast-growing, short-lived trees, small snags several inches in diameter should begin to occur at borrow pits of approximately 10 years of age or older. Ages of the study borrow pits were unknown, with the exception of BP3, BP20b, and BP23. Although BP23 was less than 5 years old, it was surrounded by snag trees because the bottomland hardwoods around it were not destroyed when the pit was built.

70. One exotic bird species, the European starling, was found nesting in cavities. This introduced species is rapidly increasing in the Southern United States and competes with native species for cavity habitats. This competition has especially impacted red-headed and red-bellied woodpeckers, which make about the same size nest cavity preferred by starlings.

71. Cavities large enough for wood ducks were available at a number of borrow pits, but they were scarce. Wood duck broods were observed in a number of borrow pits, especially in 1982. In 1983, most of the pits were still under water in July. Although pit inundation did not seem to affect wood duck nesting, it probably affected a hen's ability to feed and raise a brood of ducklings.

72. The high water in 1983 seemed to seriously affect cavity nesting by Carolina wrens and prothonotary warblers. They tend to nest in cavities lower to the ground, and wrens have been known to nest in fallen logs. Both species also nest in wood duck boxes only a few feet off the ground. Water was over most of the nesting areas through the entire 1983 nesting season in southern Louisiana, and for most of that season from Vicksburg north. The six woodpecker species, eastern bluebirds, Carolina chickadees, tufted titmice, and great-crowned flycatchers did not seem to be hampered in their nesting activities by the high water. Their numbers remained relatively constant both years.

Colony nesters

73. Eight bird species that nest in colonies were found at the 26 borrow pits. There was a 40-percent drop in nests from 1982 to 1983, primarily due to flooding and fewer nests at the colony in BP23. Although green-backed herons are considered colony nesters, they also nest individually and were found in single nests at several borrow pits. Anhingas also will nest individually, in small groups, or in mixed colonies.

74. Although several colonies were found close to borrow pits inside the levees (see paragraph 27), only one mixed-species colony was found at a borrow pit. BP23 had a small colony on a long, narrow island both years. Nests were built in small green ash, sweet gum, and black willow trees, and in 1983 these trees were almost completely under water until July.

Other tree nesters

75. A total of 24 species nested in trees in open, or constructed, individual nests. These were mostly songbirds, a number of whom were adversely affected by high-water levels in 1983. The change in habitat was associated with nesting decreases as great as 60 percent in hooded warblers, 31 percent in red-eyed vireos, 69 percent in white-eyed vireos, 72 percent in

yellow-billed cuckoos, and 69 percent in red-winged blackbirds. These declines were evidently a result of water over considerable portions of their usual nesting areas.

76. More noteworthy was the number of species that seemed unaffected by the high water. Acadian flycatchers, blue-gray gnatcatchers, northern orioles, mourning doves, and eastern wood-pewees, for example, nested in almost the same numbers in both 1982 and 1983. Mississippi kites nested throughout the Lower Mississippi River Valley and fed over almost all of the borrow pit areas both years. However, only a few nested within the confines of the study pit areas. Their nests were all in tall trees. Pecans, oaks, and green ash seemed to be the preferred nest trees.

Shrub nesters

77. Only nine species usually nested and lived in relatively low, dense, shrubby vegetation, often only a few feet off the ground. A lot of shrub habitat was present around the borrow pits. In 1983 this habitat was all under water except shrubs on levee slopes and taller shrubs around the pits. The 1983 nests were found mostly in small trees and higher vine thickets. These species had to forage for food on levees beyond the pits. Across all nine species there was a 56-percent decline. Brown thrashers, field sparrows, loggerhead shrikes, northern cardinals, and rufous-sided towhees had over 50 percent fewer nests around the study pits in 1983. Only three towhee nests were found in 1983 compared to 14 found in 1982.

Levee nesters

78. Five species were separated from other groups of nesting birds because they built nests only on the toes, slopes, or tops of the levees. Those nests on top of the levee were not always within the 30-yard sampling limit in 1982, but most were included within that limit in 1983 because high water caused the transects to be moved to within 30 yards of the levee tops.

79. Horned larks north of Memphis and eastern meadowlarks were common nesters in levee slope grass. Northern bobwhites nested on the levee toes in grass cover near taller vegetation between the levee and the borrow pit; in 1983 they nested further up the levee slopes. In 1982, all killdeer nests were found on bare sand around the pit areas. In 1983, all killdeer nests were in bare spots on levee tops near or on the levee road. One pied-billed

grebe pair nested on the levee toe at BP18 in 1982; no grebe nests were found in 1983.

Other ground nesters

80. Only three ground-nesting species were found around study borrow pits, all in dense vegetation cover. Kentucky warblers nested in low numbers in 1982, but only one nest was found in 1983, in Missouri. A few mallards nested in Arkansas both years. One mallard brood was found on an island in BP1 in Madison Parish, La., in 1982.

81. Large numbers of wild turkeys were present throughout the study area south of Memphis, especially in the Mississippi Delta area and in Louisiana north of Logansport. However, only two nests were found around borrow pits in 1982, and water was too high for turkey nests in 1983.

Other

82. Brown-headed cowbirds were present in considerable numbers year-round and reproduced within the borrow pit areas. All cowbird eggs found were in nests of northern cardinals, white-eyed vireos, and red-eyed vireos.

Mammals

83. Twenty-three wild mammal species were found during the 2-year study, with a total of 4,152 individuals observed. Species seen were the beaver, bobcat, coyote, long-tailed weasel, mink, muskrat, nutria, raccoon, red fox, river otter, eastern cottontail, eastern gray squirrel, eastern fox squirrel, swamp rabbit, white-tailed deer, armadillo, black bear, eastern chipmunk, opossum, rice rat, spotted skunk, striped skunk, and white-footed mouse. By far, the largest numbers of wild mammals observed were white-tailed deer; 703 were recorded.

84. Six domestic mammal species were also observed using borrow pit habitats. These were cattle, cats, dogs, horses and mules, sheep, and goats. Since the primary land use of levee/borrow pit complexes in the Lower Mississippi River Valley is livestock grazing, it is no surprise that 11,505 head of cattle were noted during the study. No analysis was made on domestic animals; their presence was noted to show competition for habitat with wildlife using the borrow pit areas.

85. Mammals used all parts of borrow pit areas (30 yards of all sides from water's edge), including pools, levees, log and debris piles, islands, berms and roads, and all vegetation areas where food and cover were available. This changed dramatically during high river stages, when the borrow pits were completely under water. Deer and small mammals moved to the landside of the levees, and river otters, beavers, and nutria were found swimming in floodwaters or resting on floating debris inside the levees.

Furbearers

86. A number of furbearer species usually trapped commercially (Chabreck 1968, Lowery 1981) were observed. Differences among borrow pits in occurrence and abundance of furbearers were great, primarily as a result of habitat variations. Raccoons were universally present at borrow pit habitats. One bobcat; only a few weasels, minks, muskrats, red foxes, and river otters; and no eastern gray foxes were observed. These mammals were sparsely represented and were seen at only a few pits. Since these species are usually more difficult to observe than beavers, coyotes, and raccoons, these observations probably do not reflect population levels.

87. The low number of red and gray foxes and the high number of coyotes have been increasingly observed in the Lower Mississippi River Valley for the past 15 years.* All three species compete for the same food sources, occupy similar habitat niches, and have some similar behavioral characteristics (Lowery 1981).

88. Nutria were found living in the borrow pits as far north as East Carroll Parish, La. Expansion of their range up the Mississippi River from southern Louisiana has been occurring steadily, and their northern range limit may not have been reached. The species was found occurring alone or with beavers or muskrats, or both. No evidence of competition between species, as suggested by some furbearer researchers, was detected over the 2 years of data collection.

89. Beavers occurred in all borrow pits wherever standing water was present, except BP3. The species seemed to have found borrow pits well suited to their habitat requirements. They did not build lodges, but used island and

* Personal Communication, 1984, Edward P. Hill, US Fish and Wildlife Service, Starkville, Miss.

borrow pit banks for den sites. When a borrow pit dried out, they temporarily moved elsewhere. All vegetation types associated with the borrow pits had beaver use, and only intense human disturbance such as that occurring at BP3 and BP24 seemed to discourage them. Beavers were common at BP7 at Eagle Lake in 1981-1982. However, in the fall of 1983, a 12-foot alligator moved into the borrow pit, and no more beavers were observed for the duration of the study. Alligators frequently prey on beavers, so this reduction was not surprising (O'Neil and Linscombe 1976).

90. River otters were present at only three borrow pits. In BP13, they occurred throughout the 2-year study. In BP6 and BP20a, however, they were apparently moving through the area, as they were seen on only one occasion.

91. Muskrats were present in low numbers in borrow pits which had marshy vegetation such as smartweed stands along shorelines and in standing shallow water. They were not seen in borrow pits that had no adjacent understory or had been recently disturbed. The primary limiting influence in borrow pit use by muskrats may have been the shortage of plants usually preferred as food.

Game species

92. Only five commonly hunted game species were observed at borrow pits in the study area. These were the eastern gray squirrel, eastern fox squirrel, swamp rabbit, eastern cottontail, and white-tailed deer. All but the eastern gray squirrel occurred to some extent in all vegetation types at borrow pits. Gray squirrels do not usually frequent land inside the levees (Lowery 1981). Eastern fox squirrels were seen even at sparsely wooded borrow pits with no understory, although only a few squirrel dens were found at any borrow pits. Since this species is known to travel across long distances in search of food, the animals probably were denning in less disturbed areas and feeding around the borrow pits.

93. Eastern cottontails were as likely to be observed as swamp rabbits. However, at wetter borrow pits, swamp rabbits were seen around the pits and cottontails were seen more closely associated with levees. In early summer 1982, cottontails were abundant around the borrow pits. In 1983, after months of high water, few cottontails were observed. Cottontail populations are subject to localized population fluctuations, but high water may have influenced the yearly differences.

94. White-tailed deer were commonly found at most borrow pits. In certain areas offering suitable and protected wooded habitats, such as those at BP1, BP2, BP23, and others, deer were observed in large groups. No deer were found at borrow pits south of Baton Rouge or in Missouri. During high water at numerous borrow pits, deer were observed crossing the levees and staying in the center of large open fields where they could see from all directions. When floodwaters receded inside the levees, the deer returned to the leveed floodplain.

Nongame species

95. A number of species generally considered nongame animals were found in and around the borrow pits. These species occasionally are also trapped for pelts in Louisiana and Mississippi. Only opossums and striped skunks were common. They occurred at all borrow pits. These two species utilize a variety of habitats and occur in both wet and dry areas (Herbert 1977). Borrow pits apparently were generally too wet for such species as eastern chipmunks, rice rats, white-footed mice, and other burrowing animals to occur with regularity. Spotted skunks usually frequent only upland wooded habitats, but individuals were found at three borrow pits. Habitat changes due to disturbances in riparian communities seemed to have no influence on these common species.

96. One black bear was seen at BP7 after high water in 1983, and bear tracks were found at BP2. Black bears have almost been eliminated from their southern range except for a few animals in the Louisiana swamps and some individuals reintroduced into Mississippi bottomland hardwoods. Black bears generally frequent large, isolated wooded areas where a varied food supply is available (Landers et al. 1979). Limited hunting seasons are set for black bears in some Deep South states. However, generally black bears are protected by law and, in the State of Mississippi, are listed as endangered.

97. Armadillos were regularly seen on levees and levee highways south of Lake Providence, La., and were very common in southern Louisiana. However, they did not frequent the borrow pit areas. The few burrows that were found were under logs and debris on the levee side of borrow pits. The species apparently prefers drier habitats.

Mammals using pool areas

98. Seven of the 23 wild mammal species observed were grouped for statistical analysis because of their common use of borrow pit pools (Figure 9). These species were: beaver, nutria, raccoon, muskrat, river otter, rice rat, and mink. A total of 827 individuals of these seven species were found; 314 (38 percent) were beaver, 366 (44 percent) raccoon, and 87 (11 percent) nutria. These seven were the only mammal species that frequented the water area of each borrow pit complex. The remaining 16 wild mammal species were as apt to occur anywhere in the leveed floodplain as around bodies of water.

99. BP1, BP2, BP4, BP11, BP14, BP17, BP18, BP20a, BP20b, and BP22 had significantly greater use by these seven species ($P < 0.0001$) than the remaining 16 pits. The greatest numbers of observations were for BP11, BP17, and BP20b. These pits seemed to have few physical characteristics in common, as BP11 is the largest pit (91 acres) in the study and BP20b is almost the smallest (6 acres). BP11 and BP17 both have islands and considerable habitat diversity of wooded and open areas, whereas BP20b was almost completely open habitat during the study because it was a relatively new pit. There were no significant associations between the seven species and the distance from the river, the size of the three pits, or habitat type.

100. The 10 pits that showed significantly higher levels of these seven mammals were generally moderately grazed, whereas pits that were nongrazed or were intensely grazed generally had less use by these same species. These pits also generally had more open woods and understory vegetation.

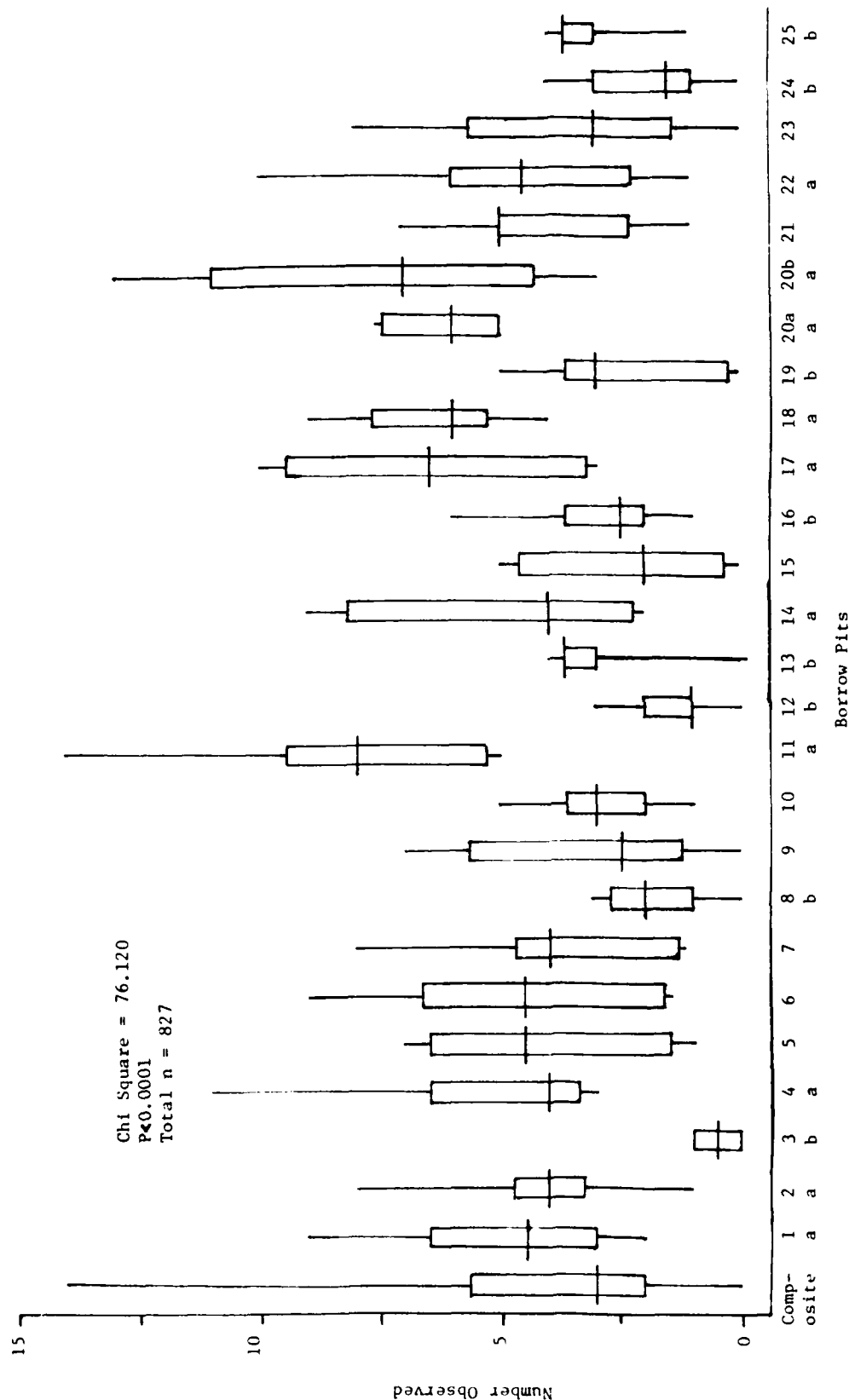


Figure 9. Relationships between the 26 borrow pits and numbers observed of seven mammal species (beaver, nutria, racoon, muskrat, river otter, rice rat, and mink). Medians and ranges are based on eight sampling periods over 2 years. The vertical line depicts observation ranges, the vertical rectangle depicts 75 percent of the observations, and the horizontal line depicts a median of pit observations. Pit numbers with letters beneath them differing from one another are significantly different at the $P < 0.0001$ level, where "a" indicates that 75 percent of pit observations were larger than a median of all the pits and "b" indicates that 75 percent of pit observations were smaller than a median of a composite of all the pits

PART IV: SUMMARY

101. The 2-year study of birds and mammals utilizing borrow pit habitats in the Lower Mississippi River Valley produced baseline biological and ecological data that may be beneficial in borrow pit design and construction and in management for land within the levees. At the 26 borrow pits selected as study sites, 23 wild mammal species and 186 bird species were observed over eight seasonal sampling periods. A total of 67 species of birds were found nesting in borrow pit habitats. Of the more than 200,000 individual animal observations recorded, 99 percent were of birds. Within bird observations, 50 percent of all species and 94 percent of all observations were of perching land birds (songbirds).

Birds

102. For the 186 species, individual bird observations at borrow pits were highest in pits with open land or scattered trees with no understory or that were intensively grazed, more than 1 mile from the river, and more than 30 acres in size.* However, these physical and environmental characteristics were not necessarily good indicators of habitat quality or borrow pit design features because large overwintering or migratory blackbird, swallow, and robin flocks exaggerated the importance of open land and intensively grazed sites (Landin 1985). While individual observation totals were highest in open borrow pit habitat, the greatest species diversity occurred in pit habitats of moderately grazed bottomland hardwood. Nesting data showed both total nests and total nesting species at greatest levels in bottomland hardwood, moderately grazed habitat, which corresponded with the borrow pit habitat type found most beneficial for the greatest numbers of bird species.

103. Individual bird species and group occurrence varied according to various borrow pit characteristics. Waterbirds, shorebirds, and seabirds, three groups that include among them rare and endangered species, made greatest use of open borrow pit areas with scattered trees or pasture. The waterbirds fed and loafed in especially large numbers in such habitats. All other

* Pit sizes and physical characteristics are discussed in Appendix A and summarized in Table A1.

bird groups (waterfowl, raptors, nonperching birds, upland gamebirds, and songbirds) made greater use of wooded borrow pit habitats. Since the five latter groups made up the majority of the 186 bird species observed, the resulting total species preference was for wooded habitats, a habitat characteristic not necessarily best suited for the waterbird, shorebird, or seabird groups (Landin 1985). In such a situation, resource decisions as to which species are most important must be made, and environmental aspects of borrow pit design and maintenance should be based on those species for a given borrow pit in a given reach of the river.

Mammals

104. Across the 23 species, mammals at borrow pits had their highest occurrence in bottomland hardwood habitats that were nongrazed, more than 1 mile from the river, and more than 30 acres in size. Mammal occurrence and utilization of borrow pits were lowest at pits that consisted of open land or scattered trees with no understory, were intensively grazed, were less than 0.5 mile from the river, and were less than 10 acres in size. Food occurrence and cover availability were found to be the overriding factors in mammal use by the 23 species (Landin 1985).

105. Because no two mammal species found during the study have the same habitat requirements (Burt and Grossenheider 1964, Lowery 1981), each mammal species' importance should be weighed by a resource agency or manager to determine the selected species for which borrow pit design, habitat management, and/or improvement will be directed. If, for example, beaver is the primary selected mammal species, the type of habitat around borrow pits to be designed, developed, and maintained should match that found to be optimal for that species. Beavers responded best to pit habitats characterized by bottomland hardwoods with good understory surrounding the borrow pit, moderate grazing, a location more than 1 mile from the river, area of over 30 acres, infrequent flooding, and a general water depth over 6 feet. Other mammal species found within the levees appeared to be sufficiently adaptable that adequate populations of furbearers, game, or nongame species could be achieved and maintained by borrow pit habitats designed and managed for beaver (Landin 1985).

General Considerations

106. Both bird and mammal species occurred in greater diversity at borrow pits that were surrounded by bottomland hardwoods with good understory, infrequently flooded, more than 1 mile from the river, and larger than 30 acres in size. Differences occurred between bird and mammal use with livestock grazing increases and with depth of permanent water in the borrow pit pools (Landin 1985). Although mammal species diversity and individually observed mammals were greater in nongrazed habitats, birds had greater species diversity in moderately grazed borrow pit areas. Since moderate grazing usually created greater habitat diversity and ecological edge around borrow pits, birds were generally able to find more available habitat.

107. All species of mammals occurred in larger numbers, and species diversity was greater, at shallow borrow pits generally less than 2 feet deep, whereas bird species occurrence was greatest at borrow pits that had permanent water pools generally more than 6 feet deep. These deeper borrow pits retained a water pool even in drought conditions, and generally tended to provide a wider range of habitat conditions at the lowest river stages, from mudflats to marsh to standing water pools.

108. Borrow pits that were generally more than 6 feet deep and were moderately grazed provided more habitat diversity and were almost as well suited for mammals as for birds. Therefore, a suitable borrow pit for wildlife, based on the findings of this study (presented in this report and in Landin 1985), is considered to be one designed and maintained to achieve the following features:

- a. Land adjacent to pit pool vegetated with mixed bottomland hardwood forest (or developing riparian forest), with good vine and herbaceous understory.
- b. Moderate grazing or at least occasional mowing to maintain some open areas and habitat diversity.
- c. Flooding less than 1 month each year, but flooded often enough to rejuvenate and stimulate invertebrate and fish populations in the borrow pits.
- d. Depths which maintain some water pools permanently, even at drought conditions, and which provide both shallow- and deep-water areas.
- e. Size of pit at least 30 acres.
- f. Built more than 1 mile from the river where possible.

109. Among the borrow pits examined in this study, BP1, BP2, BP7, BP11, BP14, BP17, and BP23 exhibited most of the features listed above. They also had very high mammal and bird use. One other feature (found in BP1, BP11, and BP16) that seemed to be beneficial and could easily be incorporated into design is small islands, generally less than 1 acre, created by construction equipment operators as borrow pits are excavated. These small, wooded islands provide safe loafing and denning places for a number of animals within borrow pit complexes.

110. A borrow pit designed for maximum habitat diversity and wildlife use could entail plans and construction which (a) allow for maximum size of pit in the area designated for borrow, (b) allow for irregularly shaped rather than straight shorelines, (c) leave one or more "islands" in the borrow area that will become surrounded by water as the pit fills, and (d) make various gradations in the borrow area that will ultimately create irregular bottoms, gently sloped shoreline areas, and shallow-water (less than 2 feet deep) areas in a pit that on the average is approximately 6 feet deep. This last feature, average water depth, may be difficult to achieve if the designated borrow area is too small to allow for construction of a large pit and a more shallow pit may be necessary. Since designated borrow areas are generally at or near the levee toe, the distance a pit occurs from the river is not a feature that can be controlled.

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Table 1
Data Collection Schedule at Each of the 26 Borrow Pits

<u>Time Period</u>	<u>Activity</u>
Dawn* to 1.5 hr after dawn	Observations from the established observation point(s) at each borrow pit.
Approximately 0800 to 0930 hr	Walk and record wildlife observations along 30- by 300-yard variably located transects which fluctuated with water level (shoreline). A maximum of four transects were established per pit.
Approximately 1930 to 1200 hr	Check circular plots and transects for animal signs (transects same as above and fluctuated with shoreline).
Approximately 1200 to 1600 hr	Complete HES and other data forms; in summer months, conduct vegetation sampling.
1.5 hr before dusk to dusk**	Observations from the established observation point(s) at each borrow pit.
Dusk to 1.5 hr after dusk	Spotlight observations for nocturnal wildlife from the established observation point.

NOTE: Observation times at dawn and dusk flexed according to the seasonal changes in day length; however, observations did not exceed 2.0 hr in any observation period regardless of season. This work schedule was repeated every 3 months throughout the study.

* Dawn is defined as first light in this study.

** Dusk is defined as that time after sundown at which it is too dark for human eyes to see without artificial aids.

Table 2
Seasonal Observations of Wildlife at the 26 Borrow Pits Studied Along the Lower Mississippi River*

SPECIES	1982				1983				TOTAL	AVERAGE	MAXIMUM
	WINTER	SPRING	SUMMER	FALL	WINTER	SPRING	SUMMER	FALL			
	BPI										
ACADIAN FLYCATCHER	0	0	7	0	0	0	4	0	11	1.38	7
AMERICAN COT	20	0	0	0	11	3	0	0	34	4.25	20
AMERICAN CROW	6	4	3	5	2	2	0	6	28	3.50	6
AMERICAN GOLDFINCH	14	0	0	0	6	0	0	0	20	2.50	14
AMERICAN KESTREL	5	2	1	2	4	1	0	1	16	2.00	5
AMERICAN ROBIN	100	21	0	0	12	0	0	0	133	16.63	100
AMERICAN REDSTART	0	2	0	0	0	0	0	0	2	0.25	2
AMERICAN WOODCOCK	3	0	0	0	1	0	0	0	4	0.50	3
ANHINGA	0	0	4	0	0	0	4	3	11	1.38	4
BALD EAGLE	0	0	0	0	0	0	0	1	1	0.13	1
BARRED OWL	2	2	2	2	2	0	4	2	17	2.13	4
BLACK-CROWNED NIGHT HERON	0	0	0	0	0	0	0	0	4	0.50	2
BEAVER	3	2	3	3	1	1	0	2	15	1.88	3
BELTED KINGFISHER	0	2	2	0	3	1	2	1	11	1.38	3
BLUE-GRAY GNATCATCHER	1	1	5	2	0	0	2	2	13	1.63	5
BROWN-HEADED COMBIRD	300	50	100	100	200	50	25	250	1075	134.38	300
BANK SWALLOW	0	10	0	50	0	7	3	9	67	8.38	50
BLUE JAY	13	4	9	7	10	0	5	6	60	7.50	13
BLACK VULTURE	3	0	4	0	9	0	5	0	34	4.25	9
BREWER'S BLACKBIRD	7	0	0	0	5	0	0	0	12	1.50	7
BARN SWALLOW	0	25	7	50	0	12	3	50	147	18.38	50
BROAD-WINGED HAWK	0	18	0	0	0	2	0	0	20	2.50	18
BLUE-WINGED TEAL	0	10	0	23	0	4	0	12	49	6.13	23
CAROLINA CHICKADEE	12	12	17	14	12	8	11	9	95	11.88	17
CATTLE EGRET	0	0	50	50	12	25	50	50	237	29.63	50
CANVASBACK	0	0	0	0	3	0	0	0	3	0.38	3
CASPIAN TERN	0	0	0	0	0	0	0	6	6	0.75	6
CATTLE	25	25	25	50	25	25	25	25	225	28.13	50
CAROLINA WREN	4	5	8	5	2	2	6	5	37	4.63	8
CHIPPING SPARROW	2	0	0	0	0	0	0	0	2	0.25	2
CHIMNEY SWIFT	0	0	4	12	0	0	10	7	33	4.13	12
COMMON GRACKLE	500	12	15	100	500	100	6	200	1433	179.13	500
COMMON SNIPES	1	0	0	0	1	0	0	0	2	0.25	1
COYOTE	1	1	0	2	1	0	0	2	7	0.8	2
COMMON YELLOWTHROAT	0	2	8	2	0	0	4	0	16	2.00	8
DOUBLE-CRESTED CORMORANT	0	0	12	6	0	5	0	10	33	4.13	12
DOMESTIC OR FERAL DOG	3	0	1	2	0	1	3	1	12	1.50	3
DOWNY WOODPECKER	1	1	3	3	1	1	3	3	16	2.00	3
EASTERN BLUEBIRD	3	5	8	7	2	2	9	4	40	5.00	9
EASTERN COTTONTAIL	1	1	1	3	0	1	3	2	11	1.38	3
EASTERN KINGBIRD	0	0	5	4	0	0	1	4	14	1.75	5
EASTERN MEADOWLARK	50	12	14	40	20	9	3	12	160	20.00	50
EASTERN PHOEBE	4	1	0	0	1	0	0	0	6	0.75	4
EASTERN SCREECH-OWL	1	1	2	1	2	0	4	1	12	1.50	4
EASTERN WOOD-PEWEE	0	2	7	3	0	0	2	2	18	2.25	7
EASTERN FOX SQUIRREL	35	25	15	30	32	20	10	33	200	25.00	35
EUROPEAN STARLING	0	3	0	2	2	3	0	0	10	1.25	3
FISH CROW	0	0	0	0	0	0	0	0	0	0	0

* Totals for each borrow pit include domestic animal species as well as wild species, and only reflect the observation number across all five sampling methods used at each pit at each season for each species observed.

Table 2 (Continued)

FIELD SPARROW	30	4	0	6	20	6	0	0	0	66	8.25	30
FOX SPARROW	3	0	0	0	0	0	0	0	0	3	0.38	3
FORSYTH'S TERN	3	0	0	0	0	0	0	0	0	2	0.25	2
GREEN-BACKED HERON	0	2	0	0	0	0	0	0	0	2	1.63	2
GREAT BLUE HERON	6	3	7	5	5	4	4	4	4	45	5.63	5
GREAT-CRESTED FLYCATCHER	0	0	3	1	1	1	2	2	2	8	1.00	1
GREAT HORNED OWL	0	1	1	0	1	0	0	0	1	6	0.75	1
GRASSHOPPER SPARROW	0	2	0	0	0	0	0	0	0	6	0.50	2
GRAY CATBIRD	0	0	0	0	0	0	0	0	0	6	0.75	3
GRAY EGRET	2	4	3	2	3	11	12	15	15	75	9.38	19
HAIRY WOODPECKER	2	5	4	4	0	0	0	0	0	26	3.25	5
HERMIT THRUSH	1	0	0	0	0	0	0	0	0	1	0.13	1
HORNED LARK	8	5	3	7	7	3	0	0	0	35	4.38	8
HOODED Merganser	3	0	0	0	6	2	0	0	0	11	1.38	6
HORSE OR MULE	4	1	0	2	0	0	0	0	3	9	1.13	4
HOODED WARBLER	0	0	2	0	0	0	0	0	0	3	0.38	2
INTIGO BUNTING	0	1	0	0	0	0	0	0	0	3	0.25	2
KILLDEER	14	21	9	6	0	6	8	10	10	50	6.25	21
LONG-BILLED DOWITCHER	0	11	6	6	0	0	0	0	0	68	8.50	14
LITTLE BLUE HERON	0	0	0	0	0	0	0	0	0	2	0.25	2
LITTLE BLUE HERON	0	0	2	5	0	4	4	3	3	15	1.88	5
LEAST SANDPIPER	4	0	0	0	0	1	0	0	0	18	2.25	9
LESSER SCAUP	9	0	0	0	0	0	0	0	0	9	1.13	2
LOGGERHEAD SHRIKE	1	1	2	1	0	1	2	0	1	9	1.13	9
MALLARD	6	9	4	3	7	6	0	21	21	56	7.00	21
MISSISSIPPI KITE	0	0	5	4	0	4	4	2	2	15	1.88	5
MOURNING DOVE	12	10	9	27	15	8	7	19	19	107	13.38	27
MUSKRAT	0	0	1	0	0	0	0	0	0	1	0.13	1
NORTHERN BOBWHITE	0	4	10	8	3	0	5	6	6	38	4.75	10
NORTHERN CARDINAL	0	16	10	8	8	6	4	12	12	90	11.25	23
NORTHERN FLICKER	9	2	3	4	7	4	4	7	7	37	4.63	9
NORTHERN HAWK	1	1	0	0	2	1	0	0	0	4	0.50	2
NORTHERN MOCKINGBIRD	4	4	6	6	1	0	0	2	2	26	3.25	6
NORTHERN ORIOLE	0	0	4	2	0	1	4	0	0	10	1.25	4
NORTHERN PARULA	0	0	2	0	0	0	2	0	0	4	0.50	2
NORTHERN PINTAIL	0	0	0	0	30	0	0	0	0	30	3.75	30
NORTHERN SHOVELER	0	0	0	0	0	0	0	0	0	8	1.00	5
NORTHERN ROUGH-WINGED SWALLOW	5	0	0	0	0	3	0	15	15	93	11.63	50
NUTRIA	1	25	0	50	0	0	0	0	0	5	0.63	2
OPUSSUM	1	1	2	2	0	0	0	2	2	11	1.38	2
ORCHARD ORIOLE	0	0	9	4	0	1	2	2	2	22	2.75	9
PAINTED BUNTING	0	0	2	1	0	0	1	0	0	4	0.50	2
PIFF-BILLED GREBE	6	4	2	0	6	0	0	0	0	20	2.50	6
PINE WARBLER	1	0	1	0	0	0	0	0	0	2	0.25	1
PILEATED WOODPECKER	2	2	4	3	1	3	5	2	2	22	2.75	5
PROTHONOTARY WARBLER	0	2	2	6	0	0	0	0	0	28	3.50	10
PURPLE MARTIN	5	6	6	12	0	4	10	4	10	37	4.63	12
RACCOON	2	3	3	3	2	2	3	3	3	18	2.25	7
RING-BILLED GULL	0	1	0	0	0	0	0	0	0	3	0.38	3
RING-BILLED WOODPECKER	4	3	7	6	3	2	0	4	4	36	4.50	7
RED-EYED VIREO	0	0	2	2	0	7	3	0	0	7	0.88	3
RED-HEADED WOODPECKER	5	5	8	8	4	6	8	7	7	51	6.38	8
RED-SHOULDERED HAWK	1	1	1	1	0	0	1	0	0	6	0.75	2
RUFIOUS-SIDED TOWHEE	2	1	2	0	0	0	0	0	0	5	0.63	2
RUFIOUS-SIDED TOWHEE	4	3	1	3	7	2	2	1	1	23	2.88	3
RUSTY BLACKBIRD	10	0	0	0	13	0	0	5	5	28	3.50	13
RED-WINGED BLACKBIRD	500	200	30	50	500	200	15	500	1995	29.38	500	
SAVANNAH SPARROW	2	0	0	0	0	0	0	0	0	2	0.25	2
SNOWY EGRET	0	0	2	4	0	3	0	6	6	15	1.88	6
SOLITARY SANDPIPER	0	0	0	0	0	1	0	0	0	1	0.13	1
SONG SPARROW	5	1	0	0	1	0	0	0	0	7	0.88	5

(Continued)

Table 2 (Cont inued)

	1953	957	586	923	1612	846	380	1568	8823	2908
SPOTTED SANDPIPER	1	1	0	0	1	0	0	0	3	0.38
SHARP-SHINNED HAWK	0	0	0	0	1	0	0	1	2	0.25
STRIPED SKUNK	0	1	1	2	0	1	1	2	8	1.00
SWAMP RABBIT	2	2	0	6	1	2	0	1	16	2.00
SWAMP SPARROW	1	0	0	0	0	0	0	0	1	0.13
TREE SWALLOW	0	300	0	0	0	250	0	100	650	81.25
TUFTED TITMOUSE	10	9	12	10	6	4	10	6	67	8.38
TURKEY VULTURE	0	2	0	0	3	0	0	2	7	0.88
VESPER SPARROW	4	0	0	0	0	0	0	0	4	0.50
WHITE-CROWNED SPARROW	7	0	0	0	0	0	0	0	7	0.88
WHITE-EYED VIREO	4	2	0	4	0	0	5	2	17	2.13
WOOD DUCK	6	4	6	4	11	1	3	4	39	4.88
WOOD STORK	0	0	0	0	0	0	0	16	16	2.00
WOOD THRUSH	0	0	2	0	0	0	0	0	2	0.25
WHITE-TAILED DEER	13	7	6	9	12	5	3	6	61	7.63
WHITE-THROATED SPARROW	50	4	9	3	9	0	0	0	63	7.88
YELLOW-BILLED CUCKOO	0	0	9	0	0	0	2	4	18	2.25
YELLOW-BELLIED SAPSUCKER	3	0	0	0	1	0	0	0	4	0.50
YELLOW WARBLER	0	0	2	0	0	0	0	0	2	0.25
YELLOW-RUMPED WARBLER	40	0	0	0	20	0	0	0	60	7.50
TOTALS	1953	957	586	923	1612	846	380	1568	8823	2908

BP2

ACADIAN FLYCATCHER	0	0	2	2	0	0	2	0	6	0.75
AMERICAN CROW	2	0	0	2	0	0	0	2	6	0.75
AMERICAN GOLDFINCH	7	0	0	0	0	0	0	0	7	0.88
AMERICAN KESTREL	2	0	1	0	20	1	0	1	7	0.88
AMERICAN ROBIN	100	27	0	0	0	5	0	0	152	19.00
AMERICAN WOODCOCK	1	0	0	0	0	0	0	0	1	0.13
ARMADILLO	0	0	3	2	0	0	0	0	10	1.25
BARRED OWL	0	0	1	2	0	0	0	0	3	0.38
BLACK-CROWNED NIGHT HERON	1	2	2	2	1	2	2	2	14	1.75
BEAVER	0	1	0	0	0	0	0	0	1	0.13
BELTED KINGFISHER	2	2	1	2	0	1	2	1	11	1.38
BLUE GRAY GRATCATCHER	1	2	1	2	0	1	1	1	9	1.13
BROWN-HEADED COBIRD	0	0	2	2	0	0	1	2	7	0.88
BANK SWALLOW	0	20	15	50	15	0	15	30	145	18.13
BLACK BEAR	0	6	0	0	0	0	0	4	10	1.25
BLUE GROSBEAK	0	0	0	1	0	0	0	0	1	0.13
BLUE JAY	0	0	2	4	5	2	3	3	29	3.63
BORCAT	6	2	4	0	0	0	0	0	1	0.13
BREMER'S BLACKBIRD	0	0	1	0	0	0	0	0	1	0.13
BROWN CREEPER	50	0	0	0	4	0	0	0	54	6.75
BARN SWALLOW	1	0	0	0	0	0	0	0	1	0.13
BROAD-WINGED HAWK	0	9	3	5	0	0	0	9	33	4.13
BLUE-WINGED TEAL	0	7	0	0	0	3	0	0	10	1.25
BLACK AND WHITE WARBLER	0	0	0	0	0	0	0	4	7	0.88
CAROLINA CHICKADEE	9	9	12	16	12	6	12	0	83	10.38
CATTLE EGRET	0	0	11	17	0	0	0	12	40	5.00
CAROLINA WREN	0	4	4	2	1	1	2	1	18	2.25
CERULEAN WARBLER	0	0	2	0	0	0	0	0	2	0.25
CHIPPING SPARROW	0	0	0	0	0	0	0	0	3	0.38
CHIMNEY SWIFT	3	0	0	5	0	0	0	2	7	0.88
COMMON CRACKLE	500	0	9	6	100	9	9	20	653	81.63
COYOTE	3	2	5	3	2	3	4	2	24	3.00

(Cont inued)

Table 2 (Continued)

COMMON YELLOWTHROAT	0	2	6	4	0	0	0	2	18	2	25	6
CHESTNUT-SIDED WARBLER	0	1	0	0	0	0	0	1	1	0	13	1
DOUBLE-CRESTED CORMORANT	0	4	0	3	0	0	4	0	1	0	38	4
COUNTY WOODPECKER	1	2	0	1	0	1	0	0	13	0	1.63	2
EASTERN BLUEBIRD	0	0	0	3	0	0	0	0	3	0	0.38	3
EASTERN COTTONTAIL	0	3	0	2	0	0	0	0	18	0	2.25	9
EASTERN KINGBIRD	0	3	1	6	2	0	0	4	16	0	2.00	6
EASTERN MEADOWLARK	3	2	0	2	0	0	0	3	19	0	3.38	4
EASTERN PHOEBE	2	0	0	0	0	0	0	0	5	0	0.38	2
EASTERN SCREECH-OWL	0	1	0	1	0	1	0	0	5	0	0.63	1
EASTERN WOOD-PEWEE	0	0	1	2	0	0	0	0	7	0	0.88	2
EASTERN FOX SQUIRREL	1	0	1	4	2	2	0	3	17	0	2.13	4
EASTERN GRAY SQUIRREL	1	1	1	0	0	0	0	1	4	0	0.50	2
EUROPEAN STARLING	2	0	0	0	0	0	0	0	2	0	0.25	2
FISH CROW	0	0	0	2	0	0	0	0	2	0	0.25	2
FIELD SPARROW	17	0	3	0	0	9	0	0	29	0	3.63	17
FOX SPARROW	3	0	0	0	0	1	0	0	4	0	0.50	3
GREEN-BACKED HERON	0	0	2	3	0	0	0	0	10	0	1.25	3
GREAT BLUE HERON	1	3	5	2	1	1	0	1	17	0	1.25	5
GREAT-CRESTED FLYCATCHER	0	0	4	4	1	1	1	2	13	0	1.63	4
GREAT HORNED OWL	0	0	1	1	0	0	0	0	5	0	0.63	1
GRASSHOPPER SPARROW	4	2	1	0	0	2	0	0	8	0	1.00	4
GRAY CATBIRD	0	0	0	0	0	0	0	0	1	0	0.13	1
GRAY EGRET	0	5	3	1	0	0	2	0	33	0	4.13	13
HAIRY WOODPECKER	3	2	4	2	0	0	0	4	21	0	2.63	4
HODDED Merganser	0	2	0	0	0	0	0	0	2	0	0.25	2
HODDED WARBLER	0	1	6	0	0	0	0	0	10	0	1.25	6
INDIGO BUNTING	0	4	5	2	4	0	0	5	34	0	4.25	15
KILLDEER	5	3	5	4	0	2	0	0	32	0	4.00	7
LONG-BILLED DOWITCHER	0	1	2	3	0	0	0	0	5	0	0.38	3
LITTLE BLUE HERON	0	0	0	0	0	0	0	0	3	0	0.63	2
LEAST SANDPIPER	0	0	2	0	0	0	0	0	5	0	0.13	1
LOGGERHEAD SHRIKE	17	0	0	9	0	0	0	0	33	0	4.13	17
LINCOLN'S SPARROW	0	0	1	0	0	0	0	0	1	0	0.13	1
MALLARD	1	0	0	0	0	0	0	0	1	0	0.13	1
MISSISSIPPI KITE	0	0	0	6	0	0	0	0	10	0	1.25	6
MOURNING DOVE	0	0	2	1	0	0	0	0	6	0	0.75	2
NASHVILLE WARBLER	4	3	2	4	0	2	0	0	24	0	3.00	4
NORTHERN BOBWHITE	0	0	0	0	0	0	0	0	1	0	0.13	1
NORTHERN CARDINAL	3	2	2	7	0	0	1	3	24	0	3.00	7
NORTHERN FLICKER	6	3	6	8	2	5	6	3	56	0	7.00	12
NORTHERN HARRIER	1	0	0	0	0	0	0	0	23	0	2.88	6
NORTHERN MOCKINGBIRD	2	1	0	0	0	1	0	0	4	0	0.50	1
NORTHERN ORIOLE	0	0	2	0	0	1	0	0	9	0	1.13	2
NORTHERN PARULA	0	1	3	0	0	0	0	0	2	0	0.25	3
NORTHERN ROUGH-WINGED SHALLOW	0	7	0	13	0	0	10	0	35	0	4.38	13
OPOSSUM	0	1	2	0	0	0	0	0	5	0	0.63	2
ORCHARD ORIOLE	0	0	4	0	0	0	0	0	8	0	1.00	4
PAINTED BUNTING	0	0	0	0	0	0	0	0	8	0	1.00	4
PIED-BILLED GREBE	0	0	0	0	0	0	0	0	8	0	0.13	1
PINE WARBLER	0	1	0	0	0	0	0	0	1	0	0.13	1
PILEATED WOODPECKER	1	1	2	2	0	1	1	0	11	0	1.38	2
PROTHONOTARY WARBLER	0	0	4	0	0	0	0	0	6	0	0.75	4
PURPLE MARTIN	0	0	3	2	0	0	0	0	4	0	0.50	2
RACCOON	2	4	3	6	0	1	2	2	22	0	2.75	6
RED-BELLIED WOODPECKER	2	3	4	3	0	2	3	4	24	0	3.00	4
RED-BELLIED WOODPECKER	2	3	4	3	0	2	3	4	24	0	3.00	4
RED-EYED VIREO	0	0	6	1	0	0	0	0	23	0	2.88	5
RED-HEADED WOODPECKER	4	0	2	5	0	0	0	0	28	0	0.63	6
RED-SHOULDERED HAWK	1	2	1	0	0	0	0	0	6	0	0.75	2

(Continued)

Table 2 (Continued)

Table 2 (Cont Inued)

[illegible]

(Continued)

Table 2 (Continued)

[illegible]

Table 2 (Continued)

YELLOW-THROATED WARBLER	0	0	2	0	0	0	0	2	0	0	0	0.50	2
TOTALS	2024	816	514	1378	1410	908	402	1022	8474	3027			
BP5													
ACADIAN FLYCATCHER	0	0	4	1	0	0	2	0	0	0	7	0.88	4
AMERICAN CROW	0	3	3	5	0	2	0	4	17	5	17	2.13	5
AMERICAN GOLDFINCH	27	0	0	0	0	0	0	0	27	27	3.38	27	
AMERICAN KESTREL	2	1	0	1	2	0	0	1	7	7	0.88	2	
AMERICAN ROBIN	100	9	0	0	25	13	0	0	147	100	18.38	100	
AMERICAN REDSTART	1	0	0	0	0	0	0	0	2	2	0.25	2	
AMERICAN WOODCOCK	0	0	0	0	0	0	0	0	1	1	0.13	1	
BARRIED OWL	0	1	1	0	1	1	0	1	6	6	0.75	1	
BEAVER	0	2	1	4	1	2	2	2	15	15	1.88	4	
BELTED KINGFISHER	0	1	1	1	0	1	0	1	5	5	0.63	1	
BLUE-GRAY GNATCATCHER	0	0	2	2	0	0	0	0	4	4	0.50	2	
BROWN-HEADED COMBIRD	200	200	130	150	200	150	50	200	1280	200	160.00	200	
BANK SWALLOW	0	6	0	12	0	6	0	10	34	12	4.25	12	
BLUE JAY	11	6	5	6	10	6	5	8	57	11	7.13	11	
BLACK VULTURE	0	0	0	2	0	0	2	0	4	4	0.50	2	
BREWER'S BLACKBIRD	50	4	0	0	25	0	0	0	79	50	9.88	50	
BROWN CREEPER	1	0	0	0	0	0	0	0	1	1	0.13	1	
BARN SWALLOW	0	12	6	19	0	11	4	15	67	19	8.38	19	
BROWN THRASHER	1	0	0	0	0	0	0	0	1	1	0.13	1	
BROAD-WINGED HAWK	0	2	0	0	0	0	0	0	2	2	0.25	2	
BLUE-WINGED TEAL	0	2	0	0	0	0	0	0	19	9	2.38	9	
BLACK AND WHITE WARBLER	0	0	0	0	0	0	0	0	2	2	0.25	2	
CAROLINA CHICKADEE	6	9	10	12	6	3	12	6	64	12	8.00	12	
CATTLE	150	10	50	50	5	12	44	50	221	50	27.63	50	
CAROLINA MREN	1	150	150	150	150	150	100	100	1100	150	137.50	150	
CERULEAN WARBLER	0	4	4	5	1	1	3	2	21	5	2.63	5	
CHIMNEY SWIFT	0	0	2	0	0	0	0	0	4	4	0.50	2	
COMMON GRACKLE	0	0	3	6	0	0	5	0	14	6	1.75	6	
COMMON YELLOWTHROAT	1000	13	6	16	500	9	2	4	1550	1000	193.75	1000	
DOUBLE-CRESTED CORMORANT	0	1	4	1	0	0	2	0	8	4	1.00	4	
DOMESTIC OR FERAL DOG	0	0	7	0	0	0	0	0	7	7	0.88	7	
DOWNY WOODPECKER	2	0	2	3	5	0	3	0	15	5	1.88	5	
EASTERN BLUEBIRD	0	1	4	2	2	0	4	2	15	4	1.88	4	
EASTERN COTTONTAIL	0	3	0	5	0	2	0	0	10	5	1.25	5	
EASTERN KINGBIRD	0	0	1	0	0	1	1	0	3	1	0.38	1	
EASTERN MEADOWLARK	17	2	5	17	0	7	3	3	22	17	2.75	17	
EASTERN PHOEBE	3	0	0	7	25	7	0	10	79	25	9.88	25	
EASTERN SCREECH-OWL	0	0	2	0	1	1	0	0	5	5	0.63	5	
EASTERN WOOD-PEWEE	0	1	2	1	0	1	2	1	8	2	1.00	2	
EASTERN FOX SQUIRREL	0	1	2	3	0	0	2	0	5	3	0.63	3	
EUROPEAN STARLING	0	0	0	0	3	0	0	0	3	3	1.38	3	
FISH CROW	0	0	0	0	0	0	0	0	4	4	0.50	4	
FIELD SPARROW	6	0	0	0	6	0	0	0	12	6	1.50	6	
GREEN-BACKED HERON	0	0	0	0	0	0	0	0	6	6	0.75	6	
GREAT BLUE HERON	0	0	1	1	1	2	2	2	12	3	1.50	3	
GREAT-CRESTED FLYCATCHER	0	0	4	2	0	0	4	2	12	4	1.50	4	
GREAT EGRET	0	0	7	13	0	0	9	16	47	16	5.88	16	
GREATER YELLOWLEGS	0	0	0	0	0	0	0	1	3	2	0.38	2	
Hairy WOODPECKER	1	2	4	4	1	2	3	2	19	4	2.38	4	
HORNED LARK	6	4	0	0	0	3	0	0	13	6	1.63	6	
HORSE OR MULE	0	0	0	12	12	12	6	6	48	12	6.00	12	

(Continued)

Table 2 (Cont Inued)

Table 2 (Continued)

TOTALS	2187	718	516	770	1556	513	353	702	7315	2693
ACADIAN FLYCATCHER	0	1	0	0	0	0	0	0	1	0-13
AMERICAN CROW	0	2	0	3	3	0	2	0	10	1.25
AMERICAN GOLDFINCH	12	0	0	0	0	0	0	0	12	1.50
AMERICAN KESTREL	1	1	0	1	1	0	1	0	5	0.63
AMERICAN ROBIN	25	0	0	0	5	0	0	0	30	3.75
AMERICAN WOODCOCK	1	0	0	0	0	0	0	0	1	0.13
ARMADILLO	0	0	0	1	0	0	0	0	1	0.13
BARRED OWL	0	1	1	1	1	1	1	0	6	0.75
BLACK-CROWNED NIGHT HERON	0	0	1	0	0	0	0	0	1	0.13
BEAVER	0	0	0	2	0	2	1	0	5	0.63
BELTED KINGFISHER	1	1	0	0	1	1	0	0	4	0.50
BLUE-GRAY GNAUTCATCHER	0	1	0	0	1	1	0	0	3	0.38
BROWN-HEADED COWBIRD	50	50	28	50	50	36	13	20	297	37.13
BANK SWALLOW	0	5	3	0	8	0	1	5	8	1.00
BLUE JAY	7	5	3	4	8	7	1	2	37	4.63
BLACK VULTURE	4	0	0	0	0	0	0	0	4	0.50
BREWER'S BLACKBIRD	20	0	0	0	0	0	0	0	30	3.75
BARN SWALLOW	0	10	6	23	10	6	7	8	60	7.50
BROWN THRASHER	1	0	2	2	0	0	0	0	5	0.63
BROAD-WINGED HAWK	0	5	0	5	0	0	0	0	5	0.63
BLUE-WINGED TEAL	0	0	0	0	0	0	0	0	9	1.13
CAROLINA CHICKADEE	7	9	9	9	3	4	8	4	55	6.88
CATTLE EGRET	0	6	20	26	5	9	18	20	102	12.75
CATTLE	50	50	50	50	0	50	50	50	350	43.75
CAROLINA WREN	2	2	4	2	0	0	2	1	13	1.63
CHIPPING SPARROW	2	0	0	0	0	0	0	0	2	0.25
CHIMNEY SWIFT	0	0	0	8	0	0	5	0	18	2.25
COMMON GRACKLE	500	17	13	26	200	7	11	12	786	98.25
COMMON SNIPES	2	0	0	0	0	0	0	0	2	0.25
COYOTE	1	0	0	0	1	0	1	0	7	0.88
COMMON YELLOWTHROAT	0	1	2	0	0	0	1	2	9	1.13
DOUBLE-CRESTED CORMORANT	0	0	3	5	0	0	0	0	8	1.00
DOMESTIC OR FERAL DOG	2	2	1	0	0	1	2	1	9	1.13
DARK-EYED JUNCO	6	0	0	0	0	0	0	0	6	0.75
DOWNY WOODPECKER	1	1	2	1	0	2	2	2	11	1.38
EASTERN BLUEBIRD	0	2	0	2	0	0	0	2	6	0.75
EASTERN COTONTAIL	0	2	4	0	0	1	2	1	10	1.25
EASTERN KINGBIRD	0	6	1	9	0	0	0	1	4	0.50
EASTERN MEADOWLARK	12	0	4	2	19	6	3	7	66	8.25
EASTERN PHOEBE	2	1	0	0	1	0	0	0	4	0.50
EASTERN SCREECH-OWL	1	1	1	0	0	0	1	0	5	0.63
EASTERN WOOD-PEWEE	0	0	2	0	0	0	0	0	3	0.38
EASTERN FOX SQUIRREL	1	1	3	2	0	0	2	2	11	1.38
EUROPEAN STARLING	0	3	0	0	9	0	6	0	18	2.25
FISH CROW	0	2	0	0	0	0	0	0	2	0.25
FIELD SPARROW	27	5	0	0	6	0	0	0	58	4.75
FOX SPARROW	3	0	0	0	0	0	0	0	3	0.38
GREEN-BACKED HERON	0	0	0	0	0	0	0	0	6	0.75
GREAT BLUE HERON	2	1	2	5	2	1	1	3	19	2.38
GREAT-CRESTED FLYCATCHER	0	0	2	1	0	0	1	1	5	0.63
GRASSHOPPER SPARROW	1	0	0	0	0	0	0	0	1	0.13
GREAT EGRET	0	2	4	9	0	0	3	6	24	3.00
GREATER YELLOWLEGS	0	0	0	1	0	0	0	0	1	0.13
HAIRY WOODPECKER	1	1	2	2	1	1	2	1	11	1.38

(Continued)

(Sheet 11 of 49)

Table 2 (Cont Inued)

[illegible]

BP 7
((Cont inued))

Table 2 (Cont Inued)

[illegible]

(Continued)

Table 2 (Continued)

MOURNING DOVE	5	3	2	2	3	1	2	2	0	2	0	2	22	2.75	5
NORTHERN BOBWHITE	0	0	0	0	0	0	0	0	0	0	0	3	0.38	2	
NORTHERN CARDINAL	11	3	2	2	3	4	0	0	1	0	0	23	2.88	11	
NORTHERN FLICKER	9	6	3	3	3	6	0	0	2	0	0	36	4.50	9	
NORTHERN HAWK	1	1	0	0	0	0	0	0	0	0	0	2	0.25	1	
NORTHERN MOCKINGBIRD	1	1	2	1	1	1	0	0	0	0	0	5	0.63	2	
NORTHERN ROUGH-WINGED SWALLOW	0	4	0	0	0	12	0	0	0	0	10	26	3.25	12	
NUTRIA	0	0	0	0	0	1	0	0	0	0	0	1	0.13	1	
OPOSSUM	0	1	1	1	1	1	0	0	1	1	0	6	0.75	1	
ORCHARD ORIOLE	0	0	1	2	0	0	0	0	2	0	0	4	0.50	2	
PIED-BILLED GREBE	0	1	0	0	0	0	0	0	0	0	0	1	0.13	1	
PINE WABLER	0	0	0	0	0	1	0	0	0	0	0	1	0.13	1	
PILEATED WOODPECKER	0	2	0	0	0	2	0	1	2	0	0	11	1.38	2	
PROTHONOTARY WARBLER	0	0	6	3	0	0	0	0	0	0	0	8	1.00	6	
RACCOON	3	2	0	0	0	5	0	1	4	0	0	20	2.50	5	
RED-BELLIED WOODPECKER	5	3	8	3	3	6	0	0	0	0	0	41	5.13	8	
RED FOX	1	0	0	0	0	0	0	0	0	0	0	1	0.13	1	
RED-EYED VIREO	0	0	0	2	0	0	0	0	0	0	0	2	0.25	2	
RED-HEADED WOODPECKER	7	6	11	0	0	7	0	0	8	0	0	57	7.13	11	
RED-SHOULDERED HAWK	0	1	1	1	0	1	0	0	0	0	0	5	0.63	1	
RUFOUS-SIDED TOWHEE	2	1	2	0	0	0	0	0	0	0	0	7	0.88	2	
RED-TAILED HAWK	0	0	0	0	0	0	0	0	0	0	0	4	0.50	2	
RUSTY BLACKBIRD	20	0	0	0	0	0	0	0	0	0	0	20	2.50	20	
RED-WINGED BLACKBIRD	500	27	11	0	0	10	0	0	0	0	16	773	96.63	500	
SAVANNAH SPARROW	2	0	0	0	0	0	0	0	0	0	0	2	0.25	2	
SNOWY EGRET	0	0	0	0	0	5	0	0	0	0	0	5	0.63	5	
SONG SPARROW	2	0	0	0	0	0	0	0	0	0	0	3	0.38	2	
SPOTTED SANDPIPER	1	0	0	0	0	0	0	0	0	0	0	1	0.13	1	
STRIPED SKUNK	0	0	1	0	0	2	0	0	1	0	1	5	0.63	2	
SWAMP RABBIT	0	1	2	0	0	0	0	0	3	1	0	9	1.13	3	
SWAMP SPARROW	6	0	0	0	0	0	0	0	0	0	0	7	0.88	6	
TREE SWALLOW	0	0	0	0	0	0	0	0	0	0	0	280	35.00	200	
TUFTED TITMOUSE	3	3	6	0	0	5	0	0	6	0	0	30	3.75	6	
WHITE-CROWNED SPARROW	2	0	0	0	0	0	0	0	0	0	0	2	0.25	2	
WHITE-EYED VIREO	0	2	4	0	0	2	0	0	0	0	1	9	1.13	4	
WHITE IBIS	0	0	0	0	0	0	0	0	0	0	3	9	1.13	6	
WILD TURKEY	6	0	0	0	0	50	0	0	7	13	0	76	9.50	50	
WOOD DUCK	0	2	4	0	0	7	0	0	4	9	0	28	3.50	9	
WOOD STORK	0	0	0	0	0	3	0	0	0	2	0	5	0.63	3	
WHITE-TAILED DEER	13	7	16	0	0	20	0	0	11	15	0	113	14.13	20	
WHITE-THROATED SPARROW	19	0	0	0	0	0	0	0	0	0	0	19	2.38	19	
YELLOW-BILLED CUCKOO	0	0	0	4	0	2	0	0	1	0	0	7	0.88	4	
YELLOW-BELLIED SAPSUCKER	0	0	0	0	0	0	0	0	0	0	0	3	0.38	2	
YELLOW-CROWNED NIGHT HERON	2	0	0	0	0	0	0	0	0	0	0	1	0.13	1	
YELLOW-WARBLER	0	0	0	0	0	0	0	0	0	0	0	1	0.13	1	
YELLOW-RUMPED WARBLER	15	0	0	0	0	0	0	0	0	0	0	21	2.63	15	
YELLOW-THROATED WARBLER	0	0	0	0	0	0	0	0	0	0	0	1	0.13	1	
TOTALS	1713	366	373	748	610	271	265	481	4827	2250					

BPS

AMERICAN CROW	0	3	3	0	0	0	0	0	0	0	0	11	1.38	3
AMERICAN GOLDFINCH	32	0	0	0	13	0	0	0	0	0	0	45	5.63	32
AMERICAN KESTREL	1	1	0	1	1	0	0	0	0	0	0	5	0.63	1
AMERICAN ROBIN	26	12	0	0	12	0	0	0	0	0	0	50	6.25	26
BARRED OWL	0	1	1	0	1	1	1	0	0	0	0	6	0.75	1
BEAVER	1	1	1	1	0	0	0	0	0	0	0	4	0.50	1

(Continued)

Table 2 (Continued)

BROWN-HEADED COMBIRD	200	100	27	150	200	150	16	50	893	111.63	200
BANK SWALLOW	0	0	0	5	0	0	0	6	11	1.36	6
BLUE JAY	2	3	2	2	7	2	2	4	25	3.13	7
BLACK VULTURE	0	0	0	2	0	0	0	0	4	0.50	2
BREWER'S BLACKBIRD	50	0	0	0	25	0	0	0	75	9.38	50
BARN SWALLOW	0	7	5	10	0	7	0	9	38	4.75	10
BROWN THRASHER	1	0	0	0	0	0	0	0	1	0.13	1
BLUE-WINGED TEAL	0	0	0	2	0	0	0	2	4	0.50	2
CAROLINA CHICKADEE	7	6	0	5	6	4	0	4	44	5.50	7
CATTLE EGRET	0	0	24	43	0	0	30	35	132	16.50	43
CATFISH	200	200	200	200	125	125	100	100	1250	156.25	200
CAROLINA WREN	2	3	2	2	1	1	2	3	16	2.00	3
CHIPPING SPARROW	2	0	0	0	2	0	0	0	4	0.50	2
COMMON GRACKLE	1000	114	9	50	400	9	3	25	1610	201.25	1000
COMMON YELLOWTHROAT	0	0	4	1	0	0	2	1	8	1.00	4
DOMESTIC OR FERAL DOG	1	0	0	0	1	0	0	1	3	0.38	1
DARK-EYED JUNCO	9	0	0	0	0	0	0	1	9	1.13	9
EASTERN BLUEBIRD	5	4	2	6	4	2	6	4	35	4.38	6
EASTERN MEADOWLARK	6	3	4	5	4	2	3	5	30	3.75	6
EASTERN PHOEBE	1	0	0	0	0	0	0	0	1	0.13	1
EASTERN SCREECH-OWL	0	1	1	1	0	1	1	1	6	0.75	1
EASTERN WOOD-PEWEE	0	1	1	1	0	0	2	0	6	0.75	2
EASTERN FOX SQUIRREL	0	1	2	4	0	0	2	0	6	2.00	4
EUROPEAN STARLING	11	12	9	13	10	12	11	3	87	10.88	13
FIELD SPARROW	12	9	0	0	8	0	0	0	29	3.63	12
FOX SPARROW	1	0	0	0	0	0	0	0	1	0.13	1
GREEN-BACKED HERON	0	0	1	0	0	0	0	1	2	0.25	1
GREAT BLUE HERON	0	0	0	1	0	0	0	1	3	0.38	1
GREAT HORNED OWL	0	0	1	0	0	0	0	0	1	0.13	1
GRAY CATBIRD	0	0	1	0	0	0	0	0	1	0.13	1
GREAT EGRET	0	0	1	1	0	0	0	0	1	0.13	1
HAIRY WOODPECKER	0	0	0	0	0	0	0	0	2	0.25	2
HORNED LARK	2	7	0	3	6	3	0	0	27	3.38	8
HORSE OR MULE	7	7	7	0	0	0	0	0	21	2.63	7
INDIGO BUNTING	0	0	2	0	0	0	2	0	4	0.50	2
KILLDEER	3	2	2	3	2	0	2	0	14	1.75	3
LESSER YELLOWLEGS	0	0	0	1	0	0	0	0	1	0.13	1
LOGGERHEAD SHRIKE	0	1	2	1	0	1	0	1	5	0.63	2
MALLARD	2	0	0	0	0	0	0	0	2	0.25	2
MISSISSIPPI KITE	0	0	3	2	0	0	2	2	9	1.13	3
MOURNING DOVE	6	4	2	4	3	2	3	4	28	3.50	6
NORTHERN BOBWHITE	0	1	2	2	0	0	1	2	8	1.00	2
NORTHERN CARDINAL	7	6	2	4	0	0	2	3	24	3.00	7
NORTHERN FLICKER	4	0	0	0	0	0	0	0	6	0.50	4
NORTHERN HARRIER	1	0	0	0	1	0	0	0	2	0.25	1
NORTHERN MOCKINGBIRD	1	2	0	0	0	0	0	0	4	0.50	1
NORTHERN ORIOLE	0	0	2	2	0	0	2	2	11	1.38	2
NORTHERN PARULA	0	0	0	0	0	0	0	0	4	0.50	2
NORTHERN ROUGH-WINGED SWALLOW	0	4	1	16	0	9	0	13	42	5.25	16
OPOSSUM	0	1	1	1	0	1	1	1	6	0.75	1
ORCHARD ORIOLE	0	0	2	0	0	0	2	0	4	0.50	2
PINE WARBLER	0	0	0	1	0	0	0	0	1	0.13	1
PILEATED WOODPECKER	1	0	0	0	0	0	0	0	1	0.13	1
PROTHONOTARY WARBLER	0	0	2	0	0	0	0	0	4	0.50	2
PURPLE FINCH	1	0	0	0	0	0	0	0	10	1.25	1
RACCOON	0	1	2	2	0	1	2	2	1	0.63	2
RED-BELLIED WOODPECKER	2	0	3	0	0	0	0	0	5	0.25	2
RED-EYED VIREO	0	0	0	0	0	0	0	0	2	0.63	3
RED-HEADED WOODPECKER	3	0	0	0	0	0	0	0	3	0.38	3
RED-SHOULDERED HAWK	0	1	1	0	0	1	0	0	3	0.38	1

(Continued)

Table 2 (Cont Inued)

[illegible]

	BP9										
ACADIAN FLYCATCHER	0	0	4	1	0	0	4	1	10	1.25	4
AMERICAN BLACK DUCK	12	0	0	0	0	0	0	0	12	1.50	12
AMERICAN CROW	4	4	0	7	2	0	0	0	22	2.75	7
AMERICAN GOLDFINCH	50	0	0	0	7	0	0	0	57	7.13	50
AMERICAN KESTREL	2	1	0	0	1	1	1	0	5	0.63	2
AMERICAN ROBIN	10	6	0	0	6	6	0	0	48	6.00	30
AMERICAN WOODCOCK	1	1	0	0	0	0	0	0	1	0.13	1
AMERICAN WIGEON	9	0	0	0	0	0	0	0	9	1.13	9
BARRED OWL	5	1	2	1	1	0	0	2	7	0.88	2
BEAVER	5	2	3	4	0	0	0	0	14	1.75	5
BELTED KINGFISHER	2	1	0	3	3	1	1	2	14	1.75	3
BLUE GRAY GNATCATCHER	0	1	4	1	0	0	0	2	12	1.50	4
BROWN HEADED COMBIRD	50	50	18	35	50	50	22	50	325	40.63	20
BROWN SWALLOW	0	15	0	20	0	7	0	12	54	6.75	20
BLUE JAY	3	3	5	6	9	5	2	8	41	5.13	9
BREWER'S BLACKBIRD	50	0	0	0	50	0	0	0	100	12.50	50
BROWN CREEPER	1	0	0	0	0	0	0	0	1	0.13	1
BARN SWALLOW	0	20	11	50	0	35	12	50	178	22.25	50
BROWN THRASHER	1	0	0	0	0	0	0	0	1	0.13	1
BLUE WINGED TEAL	0	12	0	13	0	0	0	11	36	4.50	13
CAROLINA CHICKADEE	9	9	12	14	4	7	14	12	81	10.13	14
CATTLE EGRET	0	0	7	17	0	7	15	15	55	6.88	17
CATTLE	75	75	75	75	75	75	75	75	600	75.00	75
CATFISH	2	3	3	4	1	1	4	2	20	2.50	4
CAROLINA WREN	0	0	0	0	0	0	0	0	1	0.13	1
CERULEAN WARBLER	1	0	0	0	0	0	0	0	1	0.13	1
CEDAR WAXWING	100	0	0	0	0	0	0	0	100	12.50	100
CHIPPING SPARROW	6	4	0	0	0	0	0	0	10	1.25	6
CHIMNEY SWIFT	0	0	4	3	0	0	3	0	10	1.25	4
COMMON CRACKLE	200	14	21	100	200	16	48	25	580	72.50	200
COMMON SNIPES	1	0	0	0	0	0	0	0	1	0.13	1

(Continued)

Table 2 (Continued)

[illegible]

(Continued)

Table 2 (Continued)

	1675	535	339	1195	998	429	270	1270	6511	2328
SONG SPARROW	4	1	0	0	1	0	0	0	6	0.75
SWAMP SPARROW	1	0	0	0	0	0	1	1	1	0.13
STRIPED SKUNK	0	0	1	0	0	0	1	1	4	0.50
THOMP SPARROW	0	1	6	2	1	0	2	2	14	1.75
THOMP SPARROW	7	0	0	0	1	0	0	0	8	1.00
TRINSON'S WARBLER	0	0	2	0	0	0	0	0	2	0.25
TRINSON'S WARBLER	0	0	0	500	0	100	0	500	1200	150.00
TRUMPET TIMMOUSE	100	0	7	4	3	3	6	4	33	6.13
TRUMPET TIMMOUSE	3	0	0	0	0	0	0	0	3	0.38
VESTER SPARROW	3	0	0	0	0	0	0	0	6	0.75
WHITE-CROWNED SPARROW	6	0	2	1	0	1	2	2	10	1.25
WHITE-EYED VIREO	0	2	0	0	0	0	0	0	2	0.25
WILD TURKEY	0	2	0	1	0	0	0	0	2	0.25
WOOD DUCK	14	0	5	9	0	0	0	7	40	5.00
WOOD THRUSH	0	0	2	0	0	0	0	0	2	0.25
WHITE-TAILED DEER	4	0	3	4	0	2	1	3	21	2.63
WHITE-THROATED SPARROW	33	7	0	0	0	0	0	0	40	5.00
YELLOW-BILLED CUCKOO	0	0	4	2	0	0	2	2	10	1.25
YELLOW-BELLIED SIPSUCKER	1	0	0	0	0	0	0	0	1	0.13
YELLOW-RUMPED WARBLER	17	8	0	0	9	0	0	0	34	4.25
TOTALS	1675	535	339	1195	998	429	270	1270	6511	2328

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[illegible]

(Continued)

Table 2 (Continued)

Hairy Woodpecker	2	2	2	2	1	1	1	2	1	12	1.50	2
Horned Lark	2	2	0	0	0	0	0	0	0	2	0.25	2
Hooded Merganser	9	9	0	0	20	20	20	20	20	16	12.50	9
Horse or Mule	0	0	0	2	0	0	0	2	0	5	0.63	20
Indigo Bunting	0	0	1	2	2	2	2	2	2	16	2.00	2
Killdeer	5	5	2	4	0	0	0	0	3	12	1.50	2
Mallard	2	2	4	4	4	4	4	3	2	22	2.75	5
Mourning Dove	2	2	11	7	2	2	1	2	2	29	3.63	4
Northern Bobwhite	2	2	0	2	5	5	0	0	1	17	2.13	11
Northern Cardinal	5	4	0	2	2	2	1	0	1	9	1.13	5
Northern Flicker	2	1	0	2	1	1	1	0	1	3	0.38	2
Northern Harrier	1	0	0	0	2	2	1	0	0	14	1.75	1
Northern Mockingbird	1	2	2	3	2	2	12	0	2	57	7.13	17
Northern Rough-winged Swallow	0	17	0	15	0	0	0	0	13	4	0.50	1
Opossum	0	1	1	0	0	0	1	0	1	3	0.38	2
Orchard Oriole	0	0	2	0	0	0	0	1	0	2	0.25	2
Painted Bunting	0	0	0	0	0	0	0	0	0	4	0.50	2
Pied-billed Grebe	2	0	0	0	0	0	2	0	0	2	0.25	2
Prothonotary Warbler	0	0	2	0	0	0	1	0	0	2	1.13	3
Raccoon	0	1	1	3	0	0	0	2	1	9	1.75	2
Red-bellied Woodpecker	1	2	2	1	1	2	2	2	2	14	1.75	2
Red-headed Woodpecker	1	1	2	2	2	2	2	2	2	1	0.13	1
Red-shouldered Hawk	0	0	1	0	0	0	1	1	0	6	0.75	1
Red-tailed Hawk	1	1	1	0	0	1	1	1	1	12	1.50	9
Rusty Blackbird	9	0	0	0	3	3	0	0	0	12	1.50	12
Ruddy Duck	12	0	0	0	0	0	20	2	0	35	4.18	100
Red-winged Blackbird	100	8	7	75	100	100	20	0	23	5	0.63	3
Song Sparrow	0	0	1	3	0	0	0	1	0	1	0.13	1
Shony Egret	0	0	0	0	0	0	0	0	0	5	0.63	2
Striped Skunk	0	0	1	2	0	0	0	1	1	5	0.63	2
Swamp Sparrow	2	1	1	0	0	0	0	0	0	3	0.38	2
Tree Shallow	0	30	0	50	0	0	50	4	50	180	22.50	50
Tufted Titmouse	3	3	3	4	2	2	2	4	2	23	2.88	4
Vesper Sparrow	2	0	0	0	0	0	0	0	0	2	0.25	2
White-eyed Vireo	0	2	0	1	0	0	1	0	1	7	1.38	7
White Ibis	0	0	0	7	0	0	0	0	4	11	0.50	2
Wood Duck	0	2	0	0	2	2	0	0	3	8	1.00	5
Wood Stork	0	0	0	5	0	0	0	0	2	5	0.63	2
White-tailed Deer	5	0	1	2	0	0	0	0	0	5	0.63	2
White-throated Sparrow	0	0	0	0	0	0	0	0	0	5	0.63	2
Yellow-billed Cuckoo	0	0	2	2	0	0	0	0	1	1	0.63	2
Yellow Warbler	0	1	0	0	0	0	0	0	0	1	0.13	1
Yellow-rumped Warbler	6	0	0	0	3	3	0	0	0	9	1.13	6
TOTALS	920	266	268	544	634	298	211	375	3516	1143		

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(Continued)

(Sheet 19 of 49)

Table 2 (Continued)

BEAVER	6	5	7	9	5	3	3	43	5.38	9
BELTED KINGFISHER	3	2	4	2	1	0	0	12	1.50	3
BLUE-GRAY GNAUTCATCHER	0	2	0	100	300	75	0	12	1.50	4
BROWN-HEADED COMBIRD	300	7	0	14	0	0	0	1049	131.13	14
BANK SWALLOW	0	0	0	0	0	0	0	2	0.25	2
BLUE GROSBEEK	0	0	2	0	0	0	0	85	10.63	32
BLUE JAY	32	12	7	10	0	8	0	75	9.38	50
BREWER'S BLACKBIRD	50	0	0	0	25	15	30	150	18.75	50
BARN SWALLOW	0	20	10	50	0	0	0	21	2.63	4
BROWN THRASHER	2	3	4	2	1	2	0	4	0.50	4
BROAD-WINGED HAWK	0	4	0	0	0	0	0	29	3.63	12
BLUE-WINGED TEAL	0	9	0	12	0	0	0	2	0.25	2
BLACK AND WHITE WARBLER	0	0	2	0	0	0	0	155	19.38	27
CAROLINA CHICKADEE	18	19	23	27	12	9	20	100	12.50	29
CATTLE EGRET	0	0	17	29	0	25	100	800	100.00	100
CATTLE	100	100	100	100	100	100	0	10	1.25	2
DOMESTIC OR FERAL CAT	2	2	0	2	1	6	5	49	6.13	11
CAROLINA WREN	6	7	11	10	2	2	0	6	0.75	4
CERULEAN WARBLER	0	0	0	0	0	0	0	300	37.50	300
CEDAR WAXWING	300	0	0	0	0	0	0	19	2.38	9
CHIPPING SPARROW	9	4	0	0	3	0	0	13	1.63	7
CHIMNEY SWIFT	0	0	5	7	0	0	3	465	58.13	200
COMMON GRACKLE	200	25	3	13	100	15	100	2	0.25	1
COMMON LOON	1	0	1	0	0	0	0	2	0.13	1
COMMON NIGHTHAWK	0	0	2	0	0	0	0	1	0.75	2
COMMON SNIPER	1	0	0	0	2	0	0	6	2.50	12
COYOTE	1	0	2	2	0	0	1	20	0.13	1
COMMON YELLOWTHROAT	0	3	12	2	0	0	0	36	4.50	7
CHESTNUT-SIDED WARBLER	0	1	0	0	0	0	0	18	2.25	18
DOMESTIC OR FERAL DOG	6	3	5	4	7	3	4	43	5.38	9
DARK-EYED JUNCO	18	0	0	0	0	0	0	70	8.75	15
DOWNY WOODPECKER	3	4	9	7	4	3	10	1	0.13	1
EASTERN BLUEBIRD	12	6	10	15	3	2	0	7	0.88	3
EASTERN CHIPMUNK	0	0	1	0	0	0	0	124	15.50	50
EASTERN COTTONTAIL	0	1	4	3	0	0	0	5	0.63	3
EASTERN KINGBIRD	0	1	2	3	0	0	0	17	2.13	4
EASTERN MEADOWLARK	50	12	4	14	12	6	22	15	1.88	6
EASTERN PHOEBE	3	1	0	0	1	0	0	19	2.38	3
EASTERN SCREECH-OWL	1	2	6	3	3	2	1	6	0.75	2
EASTERN WOOD-PEWEE	1	0	3	3	0	0	0	37	4.63	11
EASTERN FOX SQUIRREL	1	2	1	9	0	0	0	58	7.25	43
EASTERN GRAY SQUIRREL	11	8	0	0	7	0	0	3	0.38	3
EUROPEAN STARLING	43	0	0	0	0	0	0	17	2.13	4
FIELD SPARROW	3	0	0	0	0	0	0	8	0.63	3
FOX SPARROW	0	0	0	0	0	0	0	17	2.13	4
GREEN-BACKED HERON	0	1	4	5	0	0	0	19	2.38	3
GREAT BLUE HERON	0	1	1	4	0	0	0	6	0.50	2
GREAT-CRESTED FLYCATCHER	0	0	6	3	0	0	0	4	1.00	6
GREAT HORNED OWL	0	1	1	1	0	0	1	5	0.63	1
GRASSHOPPER SPARROW	2	1	0	0	2	0	0	8	1.00	3
GRAY CATBIRD	0	0	2	3	0	0	0	7	0.88	3
GREAT EGRET	0	0	2	5	0	0	0	2	4.63	8
HAIRY WOODPECKER	2	4	8	4	5	2	6	37	0.25	2
HERMIT THRUSH	2	0	0	0	0	0	0	47	5.88	21
HORNED LARK	21	4	3	7	8	4	0	40	5.00	5
HORSE OR MULE	5	5	5	5	5	5	5	10	1.25	6
HOODED WARBLER	0	0	6	0	0	0	0	59	7.38	41
INDIGO BUNTING	0	6	7	0	0	0	0	2	0.25	2
KENTUCKY WARBLER	0	4	2	3	2	2	3	23	2.88	4
KILLDEER	4	4	2	3	2	2	3	23	2.88	4

(Continued)

Table 2 (Cont Inued)

[illegible]

Table 2 (Continued)

TOTALS	2655	909	570	1294	1288	560	453	1431	9160	3550
AMERICAN CROW	3	0	0	2	0	0	0	3	8	1.00
AMERICAN KESTREL	1	0	0	1	1	0	0	1	3	0.38
AMERICAN ROBIN	14	3	0	0	12	0	0	0	29	3.63
ANHINGA	0	1	0	2	0	0	0	2	6	0.75
ARMADILLO	0	0	1	1	0	0	0	0	1	0.13
BARRED OWL	0	1	0	0	0	1	0	1	3	0.38
BEAVER	0	0	1	0	0	0	0	0	1	0.13
BELTED KINGFISHER	2	1	0	0	1	0	0	1	5	0.63
BROWN-HEADED COWBIRD	300	200	16	150	250	100	13	150	1179	147.38
BANK SWALLOW	0	3	0	6	0	0	0	4	13	1.63
BLUE JAY	7	4	1	3	2	2	0	3	22	2.75
BLACK VULTURE	15	8	0	6	6	0	4	10	49	6.13
BREWER'S BLACKBIRD	50	0	0	0	15	0	0	0	65	8.13
BARN SWALLOW	0	7	7	12	0	10	0	10	55	6.83
CAROLINA CHICKADEE	6	5	6	6	4	5	5	5	42	5.25
CATTLE EGRET	0	20	25	37	17	20	30	30	179	22.38
CATTLE	100	100	100	100	100	100	100	100	800	100.00
CAROLINA WREN	0	0	0	1	0	0	0	0	1	0.13
CHIMNEY SWIFT	0	0	0	4	0	0	0	0	4	0.50
COMMON CRACKLE	1000	12	3	50	200	50	4	25	1344	168.00
COMMON SNIPES	1	0	0	0	0	0	0	0	1	0.13
COMMON TERN	0	0	0	0	0	1	0	0	1	0.13
COYOTE	0	0	0	1	0	0	0	0	1	0.13
COMMON YELLOWTHROAT	0	2	4	1	0	1	2	2	12	1.50
DOMESTIC OR FERAL DOG	0	1	0	1	0	0	1	0	3	0.38
DOWNY WOODPECKER	1	1	2	2	0	1	0	1	10	1.25
EASTERN BLUEBIRD	1	0	0	0	0	0	0	0	1	0.13
EASTERN COTTONTAIL	1	2	3	0	0	0	1	0	7	0.88
EASTERN MEADOWLARK	16	5	2	9	23	12	6	8	81	10.13
EASTERN PHOEBE	1	0	0	0	1	0	0	0	2	0.25
EASTERN SCREECH-OWL	1	0	1	0	0	1	1	0	4	0.50
EASTERN WOOD-PEWEE	0	1	1	1	0	1	1	2	8	1.00
EASTERN FOX SQUIRREL	1	1	0	1	1	1	1	1	7	0.88
EUROPEAN STARLING	0	0	0	0	2	0	0	0	2	0.25
FISH CROW	0	0	0	3	0	0	0	2	5	0.63
FIELD SPARROW	7	0	0	0	3	0	0	0	10	1.25
GREEN-BACKED HERON	0	0	1	0	0	1	0	0	3	0.38
GREAT BLUE HERON	2	1	2	1	0	1	1	2	11	1.38
GREAT-CRESTED FLYCATCHER	0	0	1	1	0	1	0	1	4	0.50
GREAT HORNED OWL	0	0	0	1	0	0	0	0	1	0.13
GRASSHOPPER SPARROW	2	0	0	0	0	0	0	0	2	0.25
GREAT EGRET	0	3	5	8	0	2	3	5	26	3.25
HAIRY WOODPECKER	0	1	2	0	2	2	2	2	12	1.50
HOODED MERGANSER	2	0	0	0	0	0	0	0	2	0.25
INDIGO BUNTING	0	3	2	0	0	10	3	0	18	2.25
KILLDEER	2	3	2	2	5	2	2	2	20	2.50
LITTLE BLUE HERON	0	1	1	0	0	0	1	1	7	0.88
LEAST SANDPIPER	4	0	0	2	0	0	0	0	4	0.50
LOGGERHEAD SHRIKE	1	2	2	1	0	2	0	1	11	1.38
MALLARD	2	0	0	0	0	0	0	0	4	0.50
MISSISSIPPI KITE	0	0	1	1	0	0	1	2	4	0.50
MOURNING DOVE	6	0	1	1	0	0	1	0	3	0.38
NORTHERN BOBWHITE	0	3	2	4	0	4	5	3	36	4.50
									6	0.75

(Continued)

Table 2 (Continued)

NORTHERN CARDINAL	6	3	5	2	2	3	4	28	3.50	6
NORTHERN FLICKER	4	0	3	1	0	0	0	22	2.75	4
NORTHERN HARRIER	3	3	0	2	0	0	0	22	0.25	1
NORTHERN MOCKINGBIRD	0	4	3	0	0	0	0	22	2.75	4
NORTHERN ORIOLE	0	0	0	0	0	0	0	2	0.25	2
NORTHERN ROUGH-WINGED SWALLOW	0	25	50	0	20	0	50	145	18.13	50
NUTRIA	0	0	0	0	0	0	0	1	0.13	1
OPOSSUM	0	1	1	0	1	0	1	8	1.00	2
ORCHARD ORIOLE	0	0	0	0	0	0	0	5	0.63	3
PILEATED WOODPECKER	0	0	1	0	1	0	0	3	0.38	1
PURPLE MARTIN	0	0	2	0	0	0	0	2	0.25	2
RACCOON	1	1	1	0	1	0	1	9	1.13	2
RED-BELLIED WOODPECKER	2	3	2	2	1	2	2	13	1.63	2
RED-HEADED WOODPECKER	2	1	2	1	1	1	4	24	3.00	4
RUFOUS-SIDED TOWHEE	2	1	2	1	1	0	0	9	1.13	2
RED-TAILED HAWK	1	1	1	0	0	0	1	4	0.50	1
RUSTY BLACKBIRD	20	0	0	0	0	0	0	20	2.50	20
RED-WINGED BLACKBIRD	500	7	100	100	4	9	25	752	94.00	500
SNOWY EGRET	0	0	4	0	0	0	0	7	0.88	4
SONG SPARROW	1	0	0	0	0	0	0	1	0.13	1
SPOTTED SANDPIPER	1	0	0	0	0	0	0	1	0.13	1
SHARP-SHINNED HAWK	0	0	0	1	0	0	0	1	0.13	1
STRIPED SKUNK	0	0	1	0	0	0	0	3	0.38	1
SWAMP SPARROW	1	0	0	0	0	0	0	1	0.13	1
TREE SWALLOW	0	75	0	0	100	0	0	375	46.88	100
TUFTED TITMOUSE	2	2	2	1	2	0	100	15	1.88	2
TURKEY VULTURE	4	0	0	3	0	0	0	7	0.88	4
VESPER SPARROW	2	0	0	0	0	0	0	2	0.25	2
WHITE-EYED VIREO	1	0	1	0	0	0	1	3	0.38	1
WOOD DUCK	0	1	0	0	0	0	0	2	0.25	1
WOOD STORK	0	0	23	0	0	0	16	39	4.88	23
WHITE-THROATED SPARROW	0	1	2	0	1	0	0	4	0.50	2
WHITE-BILLED CUCKOO	7	0	0	2	0	0	0	9	1.13	7
YELLOW-BELLIED CUCKOO	0	0	2	0	0	1	2	7	0.88	2
YELLOW-RUMPED WARBLER	6	0	0	5	0	0	0	11	1.38	6
TOTALS	2117	527	235	733	781	470	232	598	5693	2439

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AMERICAN COOT	0	2	0	0	0	0	0	2	0.25	2
AMERICAN CROW	0	4	0	9	0	4	0	24	3.00	9
AMERICAN KESTREL	1	2	0	0	2	1	0	6	0.75	2
AMERICAN ROBIN	4	32	0	6	7	16	0	65	8.13	32
BLACK-BELLIED PLOVER	0	0	0	10	0	0	0	10	1.25	10
BEAVER	0	0	0	0	0	0	0	1	0.13	1
BELTED KINGFISHER	0	0	0	0	0	0	0	3	0.38	1
BROWN-HEADED COWBIRD	300	200	12	100	300	100	100	1137	142.13	300
BANK SWALLOW	0	10	0	20	0	10	15	55	6.88	20
BLUE JAY	5	12	3	4	3	4	5	41	5.13	12
BREMER'S BLACKBIRD	50	0	0	0	30	0	0	80	10.00	50
BARN SWALLOW	0	75	7	100	0	75	4	336	42.00	100
BROWN THRASHER	1	1	0	0	0	0	0	2	0.25	1
BLUE-WINGED TEAL	0	0	0	2	0	0	0	4	0.50	2
CAROLINA CHICKADEE	2	5	4	5	4	3	2	28	3.50	5
CATTLE EGRET	0	0	24	20	0	0	16	72	9.00	24
CATTLE	300	300	300	300	300	300	300	2400	300.00	300
CAROLINA WREN	1	2	2	1	2	1	1	11	1.38	2

(Continued)

Table 2 (Continued)

[illegible]

Table 2 (Continued)

	1	0	0	0	0	0	0	6	2	0	1	4	0.50	2
SPOTTED SANDPIPER	1	0	0	0	0	0	0	0	2	0	0	4	0.50	2
SWAMP SPARROW	0	0	0	0	2	0	0	6	0	0	0	8	1.00	6
STRIPED SKUNK	0	0	1	0	0	0	0	0	0	1	1	3	0.75	1
TREE SWALLOW	0	1000	0	1000	0	1000	0	0	1000	0	1000	4000	500.00	1000
TUFTED TITMOUSE	1	1	2	3	1	2	2	1	1	0	2	15	1.63	3
VESPER SPARROW	7	0	0	0	0	0	0	0	0	0	0	7	0.88	7
WATER PIPIT	0	8	0	0	0	0	0	0	0	0	0	8	1.00	8
WILLET	0	0	0	0	2	0	0	0	0	0	0	2	0.25	2
WHITE-THROATED SPARROW	3	0	0	0	0	0	0	0	0	0	0	3	0.38	3
YELLOW-BILLED CUCKOO	0	0	2	0	0	0	0	0	0	2	0	4	0.50	2
YELLOW-RUMPED WARBLER	10	0	0	0	0	0	9	0	0	0	0	19	2.75	10
TOTALS	1619	2058	431	2077	2326	1928	416	1919	12774	3875				

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[illegible]

(Continued)

Table 2 (Cont Inued)

[illegible]

(Continued)

Table 2 (Continued)

	3	3	3	4	2	3	2	4	3	24	3.00	4
RED-BELLIED WOODPECKER	0	0	0	1	0	0	0	0	0	4	0.50	4
RED FOX	0	0	0	6	0	0	0	0	0	11	1.38	6
RED-EYED VIREO	2	4	4	4	5	2	2	5	6	31	3.88	6
RED-HEADED WOODPECKER	0	0	0	0	1	0	0	0	0	1	0.13	1
RICE RAT	1	0	0	0	0	0	0	0	0	1	0.13	1
ROUGH-LEGGED HAWK	3	2	2	4	3	2	4	4	2	24	3.00	4
ROCK DOVE	0	1	1	1	0	1	0	1	0	4	0.50	1
RED-SHOULDERED HAWK	0	2	2	2	1	1	0	1	0	9	1.13	2
RUFOUS-SIDED TOWHEE	1	2	2	2	1	0	1	0	1	5	0.63	1
RED-TAILED HAWK	1	0	0	1	1	0	0	0	0	2	0.25	2
RUBY-THROATED HUMMINGBIRD	50	3	0	2	0	6	0	0	0	59	7.38	50
RUSTY BLACKBIRD	250	16	15	0	150	200	30	10	250	921	115.13	250
RED-WINGED BLACKBIRD	6	2	0	0	0	8	0	0	0	16	2.00	8
SAVANNAH SPARROW	0	0	0	2	0	0	0	0	0	2	0.25	2
SNOWY EGRET	0	1	0	0	0	0	1	0	0	7	0.88	3
SONG SPARROW	1	1	0	0	1	3	1	0	0	2	0.25	1
SPOTTED SANDPIPER	0	0	0	0	0	1	0	0	0	1	0.13	1
SPOTTED SKUNK	0	1	0	0	1	0	0	0	0	1	0.13	1
SHARP-SHINNED HAWK	0	1	0	0	0	0	0	0	0	1	0.88	2
STRIPED SKUNK	0	0	1	1	2	0	1	1	2	7	0.88	2
SUMMER Tanager	0	0	1	1	0	0	0	0	0	1	0.13	1
SWAMP RABBIT	0	0	1	2	3	1	2	1	0	10	1.25	3
SWAMP SPARROW	2	0	0	0	0	3	0	0	1	6	0.75	3
TREE SWALLOW	0	200	0	0	1000	0	200	0	750	2150	268.75	1000
TUFTED TITMOUSE	2	3	4	4	4	3	2	4	4	26	3.25	4
VESPER SPARROW	1	0	0	0	0	0	0	0	0	1	0.13	1
WHITE-CROWNED SPARROW	7	0	0	0	0	5	0	0	0	12	1.50	7
WHITE-EYED VIREO	0	2	2	2	1	0	0	2	1	7	0.88	2
WILD TURKEY	0	1	8	0	0	3	0	0	5	18	2.25	8
WINTER WREN	1	0	0	0	0	0	0	0	0	1	0.13	1
WOOD DUCK	0	6	4	4	26	8	4	1	4	53	6.63	26
WOOD THRUSH	0	0	2	0	0	0	0	0	0	2	0.25	2
WHITE-TAILED DEER	3	4	6	4	4	3	5	3	3	31	3.88	6
WHITE-THROATED SPARROW	26	0	0	0	0	17	0	0	0	43	5.38	26
YELLOW-BILLED CUCKOO	0	0	5	5	3	0	0	4	4	16	2.00	5
YELLOW-BELLIED SAPSUCKER	1	0	0	0	0	1	0	0	0	2	0.25	1
YELLOW-CROWNED NIGHT HERON	0	0	1	1	3	0	0	0	1	5	0.63	3
YELLOW WARBLER	0	0	4	1	0	0	0	2	0	6	0.75	4
YELLOW-RUMPED WARBLER	11	7	0	0	0	24	0	0	0	42	5.25	24
TOTALS	1705	606	335	1941	996	515	256	1638	7992	3631		

BP15

	0	0	1	0	0	0	0	0	0	1	0.13	1
ACADIAN FLYCATCHER	0	0	1	0	0	0	0	0	0	9	1.13	4
AMERICAN CROW	0	2	0	4	0	0	0	0	3	4	0.50	4
AMERICAN GOLDFINCH	1	0	0	0	0	0	0	0	0	4	0.50	1
AMERICAN KESTREL	1	0	0	1	0	0	0	0	1	4	1.38	6
AMERICAN ROBIN	0	3	0	0	0	6	0	0	2	11	0.63	1
BARRED OWL	0	0	1	1	1	0	1	1	1	5	0.25	2
BLACK-CROWNED NIGHT HERON	0	0	2	0	0	0	0	0	2	4	0.50	2
BEAVER	0	0	0	0	0	0	0	0	1	8	1.00	2
BELTED KINGFISHER	1	2	0	1	1	2	1	0	1	12	1.50	5
BLUE-GRAY Gnatcatcher	0	2	5	1	0	0	3	1	100	605	75.63	150
BROWN-HEADED COMBIRD	150	100	13	75	50	100	17	3	5	19	2.38	9
BANK SWALLOW	0	5	0	9	6	12	3	10	65	16	8.13	16
BLUE JAY	16	6	3	9	6	0	0	0	50	50	6.25	50
BREWER'S BLACKBIRD	50	0	0	0	0	0	0	0	0			

(Continued)

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Table 2 (Continued)

BARN SWALLOW	0	9	5	13	0	8	6	8	49	6.13	13
BROWN THRASHER	0	1	2	2	0	0	0	1	6	0.75	2
BLUE-WINGED TEAL	0	0	0	1	0	0	0	0	1	0.13	1
CAROLINA CHICKADEE	6	8	6	9	7	6	8	6	56	7.00	9
CATTLE EGRET	0	0	9	4	0	0	8	8	27	3.38	9
CATTLE	50	50	50	50	50	50	50	50	400	50.00	50
DOMESTIC OR FERAL CAT	0	0	1	5	0	1	4	2	2	0.25	1
CAROLINA WREN	2	3	4	5	1	1	4	2	22	2.75	5
CHIPPING SPARROW	2	0	0	0	0	0	0	0	2	0.25	2
CHIMNEY SWIFT	0	0	4	6	0	0	5	4	19	2.38	6
COMMON GRACKLE	300	14	35	50	200	14	35	100	748	93.50	300
COMMON SNipe	1	0	0	0	0	0	0	0	1	0.11	1
COYOTE	0	1	0	0	1	0	0	0	2	0.25	1
COMMON YELLOWTHROAT	0	2	6	3	0	0	3	1	14	1.75	6
DOMESTIC OR FERAL DOG	1	2	2	2	2	1	2	3	16	2.00	3
DARK-EYED JUNCO	4	0	0	0	0	0	0	0	4	0.50	4
DOWNY WOODPECKER	0	1	2	2	1	2	2	1	11	1.38	2
EASTERN BLUEBIRD	0	0	0	2	0	1	1	0	6	0.75	2
EASTERN COITONTAIL	0	0	3	1	0	0	2	0	6	0.75	3
EASTERN MEADOWLARK	3	5	5	6	9	3	2	6	39	4.88	9
EASTERN PHOEBE	0	1	0	0	1	0	0	0	2	0.25	1
EASTERN SCREECH-OWL	0	1	1	0	0	0	1	0	3	0.35	1
EASTERN WOOD-PEEWEE	0	1	4	1	0	0	4	3	12	1.50	4
EASTERN WOOD-STARLING	7	5	5	5	5	6	3	7	43	5.38	7
EUROPEAN STARLING	0	2	0	0	4	0	0	0	12	1.50	6
FIELD SPARROW	6	0	0	0	0	0	0	1	5	0.63	2
GREEN-BACKED HERON	0	0	2	2	0	0	2	1	12	1.50	3
GREAT BLUE HERON	0	1	4	2	0	1	4	2	11	1.38	4
GREAT-CRESTED FLYCATCHER	0	0	3	2	0	0	2	4	11	1.50	4
GREAT EGRET	0	0	0	2	0	0	0	0	2	0.25	1
GREATER YELLOWLEGS	0	0	0	1	0	0	0	1	1	0.25	1
HAIRY WOODPECKER	1	2	2	1	2	1	2	1	13	1.63	2
HORNED LARK	2	0	0	2	0	0	0	0	4	0.50	2
INDIGO BUNTING	0	0	6	0	0	8	4	2	20	2.50	8
KILLDEER	2	3	2	2	2	2	2	0	2	0.25	1
LITTLE BLUE HERON	0	0	1	1	0	0	0	0	4	0.50	1
LOGGERHEAD SHRIKE	0	1	1	0	1	0	0	1	12	1.50	6
MALLARD	0	0	0	6	0	2	6	11	46	5.75	11
MOURNING DOVE	2	5	4	7	3	8	0	1	3	0.38	1
MUSKRAT	0	0	0	1	0	0	0	1	3	0.38	1
NORTHERN CARDINAL	5	6	6	1	0	0	0	5	46	5.75	12
NORTHERN FLICKER	2	4	2	2	6	2	4	3	22	2.75	4
NORTHERN MOCKINGBIRD	2	3	4	4	3	2	1	1	18	2.25	4
NORTHERN ROUGH-WINGED SWALLOW	0	23	0	18	0	1	0	14	75	9.38	23
OPUSSUM	0	1	3	2	0	20	2	1	10	1.25	3
ORCHARD ORIOLE	0	0	4	0	0	0	4	0	8	1.00	4
PILEATED WOODPECKER	0	1	2	1	0	1	2	0	9	1.13	2
PROTHONOTARY WARBLER	0	0	4	0	0	0	4	0	8	1.00	4
PURPLE MARTIN	0	0	4	5	0	3	0	4	16	2.00	5
RACCOON	0	1	2	4	0	1	2	2	12	1.50	4
RED-BELLIED WOODPECKER	2	3	3	3	2	3	4	3	23	2.88	4
RED-EYED VIREO	0	0	2	0	0	0	4	0	6	0.75	4
RED-HEADED WOODPECKER	3	5	8	7	5	5	8	7	48	6.00	8
RUSTY-TAILED HAWK	30	2	0	1	15	1	2	2	12	1.50	30
RUSTY BLACKBIRD	100	23	13	100	100	12	0	3	48	6.00	30
RED-WINGED BLACKBIRD	3	0	0	0	2	0	0	0	5	0.63	3
SAVANNAH SPARROW	1	0	0	0	0	0	0	0	1	0.13	1
SONG SPARROW	0	1	2	1	0	0	1	0	5	0.63	2
STRIPED SKUNK	0	1	2	1	1	1	1	1	8	1.00	2
SWAMP RABBIT	3	1	0	0	5	0	0	0	9	1.13	5
SWAMP SPARROW											

(Continued)

Table 2 (Continued)

	0	100	200	0	200	0	200	0	200	700	87.50	200
TREE SWALLOW	0	100	200	0	200	0	200	0	200	700	87.50	200
TUFTED TITMOUSE	3	4	5	7	5	4	4	4	4	35	4.38	7
WHITE-CROWNED SPARROW	2	0	0	0	0	0	0	0	0	2	0.25	2
WHITE-EYED VIREO	1	1	1	2	1	0	1	0	1	6	0.75	2
WOOD DUCK	2	2	18	6	18	3	5	3	7	43	5.38	18
WHITE-TAILED DEER	0	0	0	0	0	0	0	0	0	2	0.75	2
WHITE-THROATED SPARROW	9	0	0	0	0	1	0	1	2	6	0.75	2
YELLOW-BILLED CUCKOO	0	0	0	0	0	0	0	0	0	9	1.13	9
YELLOW-BELLIED SAPSUCKER	0	4	2	0	0	0	0	3	2	11	1.38	4
YELLOW WARBLER	1	0	0	0	0	0	0	0	0	1	0.13	1
YELLOW WARBLED	0	0	0	0	0	0	0	0	0	4	0.50	1
YELLOW-RUMPED WARBLER	17	0	0	0	0	9	0	0	0	26	3.25	17
TOTALS	793	419	278	680	574	441	253	727	416	1244		

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(Continued)

Table 2 (Cont Inued)

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Table 2 (Continued)

TOTALS	2709	1599	296	3034	2598	1643	218	1918	14015	4244
ACADIAN FLYCATCHER	0	0	2	0	0	0	1	1	4	0.50
AMERICAN BITTERN	0	0	1	0	0	0	0	0	1	0.13
AMERICAN CROW	17	9	4	8	0	4	3	4	26	3.25
AMERICAN GOLDFINCH	0	0	0	4	12	6	0	0	48	6.00
AMERICAN KESTREL	32	11	0	1	1	0	0	0	4	0.50
AMERICAN ROBIN	0	0	0	6	21	15	0	0	85	10.63
AMERICAN REDSTART	0	1	0	0	0	0	0	0	1	0.13
AMERICAN WOODCOCK	1	0	0	0	1	0	0	0	2	0.25
AMERICAN WIGEON	0	2	0	0	0	0	0	0	2	0.25
BARRED OWL	0	1	1	1	0	1	0	0	4	0.50
BEAVER	2	3	4	2	3	2	3	4	23	2.88
BELTED KINGFISHER	0	1	0	1	1	1	0	1	5	0.63
BELL'S VIREO	0	0	0	0	0	2	0	0	2	0.25
BLUE-GRAY GNATCATCHER	0	0	2	1	0	0	2	1	6	0.75
BROWN-HEADED COWBIRD	100	25	50	50	100	50	12	75	462	57.75
BANK SWALLOW	0	3	0	21	0	5	0	11	40	5.00
BLUE GROSBEAK	0	4	2	0	0	0	2	1	5	0.63
BLUE JAY	3	4	5	4	11	6	5	4	42	5.25
BREWER'S BLACKBIRD	100	0	0	0	50	0	0	0	150	18.75
BARN SWALLOW	0	20	9	30	2	5	7	25	96	12.00
BROWN THRASHER	2	2	2	6	2	1	2	2	15	1.88
BLUE-WINGED TEAL	0	7	0	0	0	6	0	3	22	2.75
CAROLINA CHICKADEE	9	12	12	14	13	9	14	13	93	11.63
CATTLE EGRET	0	6	6	3	0	0	5	4	18	2.25
CATTLE	40	40	40	40	40	40	40	40	320	40.00
DOMESTIC OR FERAL CAT	0	1	0	1	0	1	0	0	3	0.38
CAROLINA WREN	2	3	0	4	3	1	2	3	22	2.75
CERULEAN WARBLER	0	0	2	0	0	0	0	0	2	0.25
CHIPPING SPARROW	5	0	0	0	4	0	0	0	11	1.38
CHIMNEY SWIFT	0	0	8	11	0	0	4	9	32	4.00
COMMON BARN-OWL	0	0	1	0	0	0	1	0	2	0.25
COMMON GRACKLE	500	20	0	35	300	4	3	100	962	120.25
COMMON NIGHTHAWK	0	0	3	0	0	0	0	0	3	0.38
COMMON SNIPES	0	3	0	0	0	0	0	2	5	0.63
COMMON YELLOWTHROAT	0	0	6	7	0	0	7	0	20	2.50
DOMESTIC OR FERAL DOG	0	3	2	2	3	2	3	2	19	2.38
DARK-EYED JUNCO	20	0	0	0	16	0	0	0	36	4.50
DOWNY WOODPECKER	1	2	4	3	2	1	4	3	20	2.50
EASTERN BLUEBIRD	3	4	3	7	7	4	6	6	40	5.00
EASTERN COTTONTAIL	0	0	4	1	0	1	3	2	11	1.38
EASTERN KINGBIRD	0	0	2	0	0	0	2	1	5	0.63
EASTERN MEADOWLARK	4	7	7	10	19	8	8	9	72	9.00
EASTERN PHOEBE	1	0	0	0	0	0	0	0	1	0.13
EASTERN SCREECH-OWL	0	1	2	1	0	1	1	1	7	0.88
EASTERN WOOD-PEWEE	0	1	2	3	0	0	4	1	10	1.25
EASTERN FOX SQUIRREL	2	2	3	2	1	3	1	2	16	2.00
EASTERN GRAY SQUIRREL	0	1	1	10	0	1	1	1	5	0.63
EUROPEAN STARLING	8	5	7	8	12	7	7	8	64	8.00
FIELD SPARROW	10	3	2	8	0	7	4	9	43	5.38
FOX SPARROW	2	0	0	0	1	0	0	0	3	0.38
GADWALL	0	2	0	0	2	0	0	0	4	0.50
GREEN-BACKED HERON	0	0	2	2	0	0	1	1	6	0.75
GREAT BLUE HERON	0	1	2	2	1	1	1	1	9	1.13

(Continued)

Table 2 (Continued)

[illegible]

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Table 2 (Cont Inued)

Table 2 (Continued)

[illegible]

Table 2 (Continued)

[illegible]

Table 2 (Continued)

TOTALS	736	346	197	543	487	273	157	537	3276	1209
ACADIAN FLYCATCHER	0	0	2	1	0	0	2	1	6	0.75
AMERICAN CROW	2	4	0	3	0	0	0	0	9	1.13
AMERICAN KESTREL	1	0	0	0	1	0	0	0	2	0.25
AMERICAN ROBIN	3	0	0	0	0	0	0	0	3	0.38
ANHINGA	0	6	4	5	0	2	3	2	22	2.75
BARRED OWL	1	1	1	1	1	0	1	1	7	0.88
BLACK-CROWNED NIGHT HERON	0	1	0	0	0	0	0	0	1	0.13
BEAVER	3	2	2	2	2	2	2	2	17	2.13
BLUE-GRAY GNATCATCHER	3	2	1	1	0	0	2	2	10	1.25
BROWN-HEADED COWBIRD	50	6	8	20	5	4	3	10	106	13.25
BANK SWALLOW	0	3	0	3	0	0	0	0	9	1.13
BLUE JAY	3	1	0	0	2	0	0	0	6	0.75
BREWER'S BLACKBIRD	12	0	0	0	0	0	0	0	12	1.50
BARN SWALLOW	0	7	0	9	0	6	0	0	29	3.63
CAROLINA CHICKADEE	3	2	3	2	2	2	2	2	18	2.25
CATTLE EGRET	3	0	9	16	2	0	3	3	36	4.50
CAROLINA WREN	2	1	2	1	0	0	0	0	6	0.75
COMMON GRACKLE	50	20	6	25	25	20	4	15	165	20.63
COMMON YELLOWTHROAT	0	1	2	1	0	0	0	0	5	0.63
DOUBLE-CRESTED CORMORANT	0	2	0	0	0	0	0	0	2	0.25
DOMESTIC OR FERAL DOG	0	2	1	0	0	0	0	0	5	0.63
DOWNY WOODPECKER	1	1	2	2	0	1	2	1	10	1.25
EASTERN MEADOWLARK	3	0	3	3	2	2	3	2	18	2.25
EASTERN PHOEBE	2	1	3	0	1	0	0	0	4	0.50
EASTERN WOOD-PEWEE	2	0	1	3	1	0	0	0	1	0.13
EASTERN FOX SQUIRREL	1	2	2	3	1	2	1	1	13	1.63
FISH CROW	0	2	0	0	0	0	0	0	2	0.25
FIELD SPARROW	2	0	0	0	2	0	0	0	4	0.50
GREEN-BACKED HERON	0	1	2	0	0	0	0	0	4	0.50
GREAT BLUE HERON	1	1	0	0	1	0	0	1	4	0.50
GREAT-CRESTED FLYCATCHER	0	1	1	1	0	0	1	1	4	0.50
GRASSHOPPER SPARROW	2	0	0	0	0	0	0	0	2	0.25
GREAT EGRET	0	0	0	1	0	0	0	0	1	0.13
HAIRY WOODPECKER	2	2	2	1	1	1	2	2	13	1.63
HODDED WARBLER	0	1	2	0	0	5	2	3	16	2.00
INDIGO BUNTING	0	2	2	2	0	0	2	2	6	0.50
KILLDEER	2	0	0	0	0	0	0	0	2	0.25
LITTLE BLUE HERON	0	0	0	1	0	1	0	0	2	0.25
NORTHERN CARDINAL	6	3	0	5	2	0	0	2	18	2.25
NORTHERN FLICKER	2	1	2	1	1	2	0	1	10	1.25
NORTHERN MOCKINGBIRD	1	1	0	1	0	0	0	0	3	0.38
NUTRIA	2	2	2	4	2	1	1	3	17	2.13
OPOSSUM	0	1	1	2	0	1	1	1	7	0.88
ORCHARD ORIOLE	0	0	2	0	0	0	2	0	4	0.50
PLEATED WOODPECKER	0	1	2	1	1	1	2	2	11	1.38
PROTHONOTARY WARBLER	1	1	2	0	1	2	2	0	12	1.50
RACCOON	1	2	1	1	1	1	2	1	11	1.38
RED-BELLIED WOODPECKER	1	0	2	1	0	0	0	0	1	0.13
RED-EYED VIREO	0	0	1	0	0	0	2	0	15	1.88
RED-HEADED WOODPECKER	2	1	2	2	2	2	2	0	7	0.88
RIVER OTTER	0	0	0	0	0	0	0	0	5	0.63
RED-SHOULDERED HAWK	0	1	0	1	0	1	1	1	5	0.25
RED-TAILED HAWK	1	0	0	0	1	0	0	0	2	0.25
RUSTY BLACKBIRD	6	0	0	0	0	0	0	0	6	0.75

(Continued)

Table 2 (Continued)

	50	8	5	20	25	4	5	12	129	16.13	50
RED-WINGED BLACKBIRD	50	0	0	0	1	0	0	0	2	0.25	1
SONG SPARROW	1	0	0	1	0	0	0	1	3	0.38	1
STRIPED SKUNK	1	0	0	2	0	0	0	0	13	1.63	6
SWAMP RABBIT	1	3	6	0	0	0	0	0	3	0.38	2
SWAMP SPARROW	0	0	0	0	1	0	0	0	180	22.50	50
TREE SWALLOW	0	50	0	30	0	50	0	50	12	1.50	3
TUFTED TITMOUSE	1	3	2	2	1	0	0	0	1	0.13	1
VESPER SPARROW	1	0	0	0	0	0	0	0	1	0.13	1
WHITE-BREASTED NUTHATCH	1	0	0	0	0	0	0	0	1	0.13	1
WHITE-EYED VIREO	1	1	0	0	0	0	0	0	3	0.38	1
WOOD DUCK	16	4	7	4	2	3	6	3	45	5.63	16
WHITE-TAILED DEER	7	4	1	3	0	1	0	2	18	2.25	7
WHITE-THROATED SPARROW	7	0	0	0	0	0	0	0	7	0.88	7
YELLOW-BILLED CUCKOO	0	1	0	1	0	0	0	1	3	0.38	1
YELLOW-BELLIED SAPSUCKER	1	0	0	0	0	0	0	0	1	0.13	1
TOTALS	264	164	96	188	89	127	57	151	1136		402

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	0	1	0	0	0	0	0	1	3	0.38	1
ACADIAN FLYCATCHER	0	1	0	0	0	0	0	0	81	10.13	27
AMERICAN CROW	5	11	0	27	0	16	0	22	22	2.75	17
AMERICAN GOLDFINCH	17	0	0	0	5	0	0	0	4	0.50	1
AMERICAN KESTREL	1	0	0	1	1	0	0	1	10	1.25	10
AMERICAN ROBIN	10	0	0	0	0	0	0	0	1	0.13	1
AMERICAN WOODCOCK	1	0	0	0	0	0	0	0	15	1.88	3
ANHINGA	0	2	3	1	0	2	3	2	1	0.13	1
ARMADILLO	0	0	0	1	0	0	0	0	7	0.88	1
BARRIED OWL	1	1	1	0	1	1	1	1	1	0.13	1
BLACK-BELLIED PLOVER	0	1	0	0	0	0	0	0	2	0.25	1
BLACK-CROWNED NIGHT HERON	0	1	0	0	0	0	0	1	16	2.00	3
BEAVER	2	2	2	3	2	2	2	1	3	0.38	1
BELTED KINGFISHER	0	0	0	1	1	0	0	1	233	29.13	100
BROWN-HEADED COWBIRD	100	3	7	10	65	12	6	30	34	4.25	15
BANK SWALLOW	0	15	7	7	0	5	0	7	15	1.88	6
BLUE JAY	3	2	0	6	2	0	0	0	2	0.25	2
BLACK VULTURE	2	0	0	0	0	0	0	0	20	2.50	20
BREWER'S BLACKBIRD	20	0	0	0	0	0	0	0	78	9.75	21
BARN SWALLOW	0	21	8	15	0	15	7	12	6	0.75	2
BROWN THRASHER	2	1	2	1	0	0	0	0	3	0.38	3
BROAD-WINGED HAWK	0	3	0	0	0	0	0	0	23	2.88	4
CAROLINA CHICKADEE	4	3	4	3	2	2	2	3	85	10.63	23
CATTLE EGRET	0	4	23	12	11	0	15	20	12	1.50	4
CAROLINA WREN	2	3	4	2	0	0	0	1	2	0.25	2
CHIPPING SPARROW	2	0	0	0	0	0	0	0	6	0.50	2
CHIMNEY SWIFT	0	0	0	2	0	0	0	2	662	82.75	300
COMMON GRACKLE	300	25	0	50	150	30	7	100	12	1.50	5
DOMESTIC OR FERAL DOG	0	2	5	2	0	1	0	2	4	0.50	2
EASTERN BLUEBIRD	2	0	1	0	0	0	0	0	2	0.25	2
EASTERN COTONTAIL	1	2	0	0	0	0	1	3	12	1.50	3
EASTERN COTONTAIL	1	2	2	3	0	0	1	3	12	1.50	3
EASTERN KINGBIRD	0	0	2	3	0	0	0	0	1	0.13	1
EASTERN MEADOWLARK	9	5	1	11	4	5	2	4	42	5.25	11
EASTERN PHOEBE	1	0	0	0	1	0	0	0	2	0.25	1
EASTERN SCREECH-OWL	0	0	1	1	0	1	1	0	4	0.50	1
EASTERN WOOD-PEWEE	0	1	2	1	0	0	0	0	4	0.50	2
EASTERN FOX SQUIRREL	2	1	1	2	1	1	1	2	11	1.38	2

(Continued)

Table 2 (Cont Inued)

TOTALS	757	222	126	321	338	156	94	432	2446	1020
AMERICAN CROW	0	2	3	3	0	2	2	3	15	7.88
AMERICAN GOLDFINCH	0	22	0	0	10	14	0	7	53	6.63
AMERICAN KESTREL	1	2	0	0	2	1	0	1	7	0.88
AMERICAN ROBIN	0	6	0	4	0	3	0	2	15	1.88
BEAVER	1	2	0	2	0	2	0	2	14	1.75
BELTED KINGFISHER	0	1	1	1	0	1	0	1	5	0.63
BLUE-GRAY GNATCATCHER	0	1	1	1	0	0	0	1	4	0.50
BROWN-HEADED COBIRD	50	16	8	50	50	12	11	50	247	30.88
BANK SWALLOW	0	0	2	2	0	0	0	0	2	0.25
BLUE GROSBEAK	0	0	0	2	0	0	0	0	4	0.50
BLUE JAY	5	3	2	8	7	5	2	8	40	5.00
BREMER'S BLACKBIRD	50	0	2	50	50	0	0	50	200	25.00
BARN SWALLOW	0	6	5	14	0	9	6	12	52	6.50
BROWN THRASHER	1	2	2	2	2	1	2	2	14	1.75
BLUE-WINGED TEAL	0	2	0	3	0	0	0	3	8	1.00
CAROLINA WREN	5	5	7	6	5	6	4	4	45	5.63
CERULEAN WARBLER	1	3	4	3	3	0	2	4	23	2.88
CHIPPING SPARROW	0	0	0	0	0	0	0	0	2	0.25
COMMON GRACKLE	3	0	0	0	0	0	0	0	3	0.38
COMMON NIGHTHAWK	1000	100	7	750	500	300	6	1000	3663	457.88
COYOTE	1	0	1	0	0	0	0	0	1	0.13
COMMON YELLOWTHROAT	0	0	0	0	0	1	0	0	2	0.25
DOMESTIC OR FERAL DOG	2	0	4	0	0	0	4	0	8	1.00
DARK-EYED JUNCO	7	2	1	2	1	0	2	1	10	1.25
DOWNY WOODPECKER	2	2	0	0	4	0	0	0	13	1.63
EASTERN BLUEBIRD	0	2	2	3	2	2	2	6	22	2.75
EASTERN COTTONTAIL	0	2	0	3	0	2	0	3	10	1.25
EASTERN KINGBIRD	0	0	4	2	0	1	3	1	11	1.58
EASTERN MEADOWLARK	2	4	2	5	4	0	1	4	6	0.75
EASTERN SCREECH-OWL	0	0	1	0	0	3	2	0	26	3.25
EASTERN WOOD-PEWEE	0	0	1	0	0	0	1	0	2	0.25
EASTERN FOX SQUIRREL	1	2	4	0	4	0	4	1	9	1.13
EASTERN GRAY SQUIRREL	0	1	2	2	4	3	3	2	19	2.38
EUROPEAN STARLING	0	1	1	2	1	1	1	1	8	1.00
FIELD SPARROW	15	10	0	0	12	0	0	0	2	0.25
FOX SPARROW	1	0	6	9	1	3	4	8	67	8.38
GREEN-BACKED HERON	0	0	0	0	0	0	0	0	2	0.25
GREAT BLUE HERON	0	0	1	0	0	0	1	0	2	0.25
GREAT-CRESTED FLYCATCHER	0	1	0	1	0	0	1	1	4	0.50
GRAY CATBIRD	0	0	1	0	0	0	2	1	4	0.50
Hairy WOODPECKER	0	0	2	2	0	0	4	4	12	1.50
HERMIT THRUSH	0	1	2	0	0	0	2	1	8	1.00
HORNED LARK	1	1	0	0	0	0	0	0	1	0.13
INDIGO BUNTING	4	6	6	15	7	6	5	12	61	7.63
KENTUCKY WARBLER	0	0	2	0	0	2	5	3	12	1.50
KILLDEER	0	2	2	6	3	2	3	5	23	2.88
LARK SPARROW	0	0	1	0	0	0	0	0	1	0.13
LITTLE BLUE HERON	0	0	1	0	0	0	0	0	1	0.13
LEAST FLYCATCHER	0	1	0	0	0	0	0	0	1	0.13
LESSER GOLDEN-PLOVER	0	0	0	1	0	0	0	0	1	0.25
LESSER YELLOWLEGS	0	0	0	1	0	0	0	1	2	0.25
LONGTAIL WEASEL	0	3	0	2	0	0	0	3	8	1.00
MALLARD	0	0	1	0	0	0	0	0	0	0

(Continued)

Table 2 (Cont Inued)

Table 2 (Continued)

BANK SWALLOW	0	9	4	0	5	0	3	6	24	3.00	9
BLUE JAY	10	4	6	0	0	0	3	4	35	4.38	10
BLACK VULTURE	8	6	7	0	0	0	0	0	29	3.63	8
BREWER'S BLACKBIRD	20	0	0	0	0	0	0	0	20	2.50	20
BROWN CREEPER	2	0	0	0	0	0	0	0	2	0.25	2
BROWN SWALLOW	0	12	0	0	10	0	4	12	66	8.25	16
BROWN THRASHER	2	3	4	0	0	0	0	0	13	1.63	4
BROAD-WINGED HAWK	0	25	0	0	5	0	0	0	30	3.75	25
CAROLINA CHICKADEE	9	10	12	8	10	0	12	10	80	10.00	12
CATTLE EGRET	0	12	19	5	4	0	3	10	69	8.63	19
CATTLE	50	50	50	0	0	0	0	10	210	26.25	50
CAROLINA WREN	3	3	4	3	1	0	0	1	20	2.50	5
CERULEAN WARBLER	1	1	0	0	0	0	0	0	1	0.13	1
CHIPPING SPARROW	10	0	0	3	0	0	0	0	13	1.63	10
CHIMNEY SWIFT	0	0	0	0	0	0	0	0	5	0.63	3
COMMON GRACKLE	500	8	25	100	6	4	4	50	699	87.38	500
COMMON Nighthawk	0	0	1	0	0	0	0	0	4	0.50	1
COYOTE	1	0	0	0	1	0	0	1	1	0.13	1
COMMON YELLOWTHROAT	0	1	0	0	0	0	0	0	1	0.38	1
DOMESTIC OR FERAL DOG	1	1	0	0	0	0	0	0	3	4.13	6
DOWNY WOODPECKER	4	3	6	3	4	0	5	2	33	0.63	3
EASTERN BLUEBIRD	0	3	0	0	0	0	0	0	5	1.38	5
EASTERN COTTONTAIL	0	2	5	0	1	0	0	0	11	1.00	3
EASTERN KINGBIRD	1	1	1	0	0	0	0	0	8	8.63	23
EASTERN MEADOWLARK	23	6	10	4	4	6	10	2	69	0.38	3
EASTERN PHOEBE	3	1	0	0	1	2	2	1	9	1.13	2
EASTERN SCREECH-OWL	1	1	2	1	1	2	2	1	12	1.50	4
EASTERN WOOD-PEWEE	0	2	4	2	3	0	4	2	23	2.88	4
EASTERN FOX SQUIRREL	3	2	3	0	0	0	0	0	24	3.00	24
FIELD SPARROW	24	0	0	0	0	0	0	0	4	0.50	4
FOX SPARROW	4	0	0	0	0	0	0	0	2	0.25	2
FORSTER'S TERN	0	0	0	0	2	0	0	0	2	0.25	1
GREEN-BACKED HERON	0	1	1	0	0	0	0	0	8	1.00	2
GREAT BLUE HERON	2	1	2	0	1	0	1	0	16	2.00	5
GREAT-CRESTED FLYCATCHER	7	2	5	0	2	4	0	0	7	0.88	2
GRASSHOPPER SPARROW	0	0	0	0	0	0	0	0	10	1.25	4
GRAY CATBIRD	0	2	2	0	1	0	0	0	35	4.38	2
GREAT EGRET	1	0	3	3	3	6	4	0	2	0.13	1
HAIRY WOODPECKER	3	4	6	0	0	0	0	0	1	4.13	12
HENSLOW'S SPARROW	2	0	0	0	0	0	0	0	33	0.75	2
HODDED WARBLER	0	1	0	0	0	0	0	0	6	0.13	1
INDIGO BUNTING	0	3	6	0	12	5	2	2	13	1.63	4
KILLDEER	4	2	3	0	0	0	0	0	6	0.13	2
LITTLE BLUE HERON	1	0	1	0	0	0	1	1	1	0.13	1
LOGGERHEAD SHRIKE	1	0	0	0	0	0	0	0	8	1.00	3
MISSISSIPPI KITE	0	0	3	0	0	1	1	0	32	4.00	6
MOURNING DOVE	6	4	2	2	4	4	6	0	2	0.25	2
NORTHERN BOBWHITE	2	0	0	0	0	0	0	0	40	5.00	12
NORTHERN CARDINAL	7	6	7	4	3	2	2	2	26	3.25	7
NORTHERN FLICKER	7	3	3	4	3	0	0	0	4	0.50	2
NORTHERN HARRIER	2	0	0	1	1	2	0	0	22	0.25	2
NORTHERN MOCKINGBIRD	4	3	4	2	2	0	0	0	7	0.88	5
NORTHERN ORIOLE	0	0	0	0	0	0	0	0	62	7.75	20
NORTHERN PARULA	0	15	5	0	0	2	0	12	6	0.13	1
NORTHERN ROUGH-WINGED SWALLOW	0	2	1	0	0	0	0	0	1	1.25	3
NUTRIA	2	1	2	0	0	0	0	0	13	1.63	3
OPPOSSUM	1	0	1	0	1	0	2	0	3	0.38	1
ORCHARD ORIOLE	0	0	4	0	0	0	0	0	3		
PINE WARBLER	1	1	1	0	0	1	1	0	1		

(Continued)

Table 2 (Continued)

BREMER'S BLACKBIRD	50	0	0	15	50	0	0	0	0	0	115	14.38	50
BROWN CREEPER	1	0	0	0	0	0	0	0	0	0	1	0.13	1
BARN SWALLOW	0	100	9	100	0	0	35	0	0	0	352	44.00	100
BROWN THRASHER	1	2	2	1	0	0	0	0	0	0	6	0.75	0
BLUE-WINGED TEAL	0	10	4	4	0	0	4	0	0	6	24	3.00	10
BLACK AND WHITE WARBLER	0	0	1	0	0	0	0	0	0	0	1	0.13	1
CAROLINA CHICKADEE	21	15	18	15	12	21	15	9	25	0	126	15.75	21
CATTLE EGRET	0	28	28	12	0	12	0	0	0	0	77	9.63	28
CAROLINA WREN	6	5	8	5	1	2	2	2	2	0	31	3.88	8
CERULEAN MARBLER	0	0	0	0	0	0	0	0	0	0	4	0.50	0
CEDAR MAXWING	100	0	0	0	0	0	0	0	0	0	100	12.50	100
CHIPPING SPARROW	6	0	0	0	0	0	0	0	0	0	6	0.75	6
CHIMNEY SWIFT	0	0	0	7	0	0	0	0	5	12	12	1.50	7
COMMON GRACKLE	300	50	6	50	100	12	10	75	0	0	603	75.38	300
COYOTE	0	0	1	0	0	0	0	0	0	0	1	0.13	1
COMMON YELLOWTHROAT	0	0	7	0	0	0	0	0	0	0	11	1.38	7
DOMESTIC OR FERAL DOG	3	0	0	1	0	2	0	2	0	0	8	1.00	3
DARK-EYED JUNCO	6	0	0	0	4	0	0	0	0	0	10	1.25	6
DOWNY WOODPECKER	2	4	6	5	4	5	8	4	0	0	38	4.75	8
EASTERN BLUEBIRD	2	3	2	2	0	2	2	3	0	0	14	1.75	3
EASTERN CHIPMUNK	0	0	2	1	0	0	0	0	0	0	3	0.38	2
EASTERN COITONTAIL	2	2	3	1	0	1	0	0	1	10	125	1.25	3
EASTERN KINGBIRD	0	0	0	1	0	0	0	0	0	1	1	0.13	0
EASTERN MEADOWLARK	0	0	0	2	0	0	0	0	2	0	6	0.75	2
EASTERN PHOEBE	2	0	0	0	0	0	0	0	0	0	2	0.25	2
EASTERN SCREECH-OWL	0	1	2	1	1	1	0	0	2	10	125	1.25	2
EASTERN WOOD-PENWEE	0	0	7	2	2	6	2	2	2	17	2.13	7	2
EASTERN FOX SQUIRREL	1	2	2	2	2	2	2	0	2	15	1.88	2	2
EASTERN GRAY SQUIRREL	2	1	1	2	0	0	0	0	1	9	1.00	2	2
EUROPEAN STARLING	4	5	1	0	0	1	0	0	0	8	1.13	5	5
FIELD SPARROW	33	12	2	5	8	0	0	0	0	60	7.50	33	33
FOX SPARROW	3	0	0	0	0	0	0	0	0	3	0.38	3	3
GADWALL	14	0	0	0	0	0	0	0	0	14	1.75	14	14
GREEN-BACKED HERON	0	0	6	0	0	4	0	0	0	0	11	1.38	6
GREAT BLUE HERON	0	2	5	5	0	1	1	2	2	16	2.00	5	5
GREAT-CRESTED FLYCATCHER	0	0	3	2	0	2	0	0	0	8	1.00	3	3
GREAT HORNED OWL	0	1	0	1	0	0	0	0	0	2	0.25	1	1
GRAY CATBIRD	0	0	1	1	0	0	0	0	0	2	0.25	1	1
GREAT EGRET	0	0	2	2	0	0	0	0	0	6	0.75	6	6
GREEN-TAILED TEAL	6	0	0	0	0	0	0	0	0	6	0.75	6	6
Hairy WOODPECKER	5	6	8	6	4	3	3	6	5	43	5.38	8	8
HERMIT THRUSH	2	0	0	0	0	0	0	0	0	2	0.25	2	2
HOODED Merganser	2	0	0	0	0	0	0	0	0	2	0.25	2	2
HOODED WARBLER	0	3	6	0	0	2	1	0	0	12	1.50	6	6
INDIGO BUNTING	0	4	8	4	0	21	2	3	3	42	5.25	21	21
KENTUCKY WARBLER	0	1	2	0	0	1	0	0	0	2	0.50	2	2
KILLDEER	3	2	4	2	0	0	0	0	0	10	1.25	3	3
LITTLE BLUE HERON	0	4	4	4	0	0	4	4	0	12	1.50	4	4
LEAST SANDPIPER	0	4	0	0	0	0	0	0	0	4	0.50	4	4
LESSER SCAUP	25	0	0	9	15	0	0	0	0	49	6.13	25	25
LESSER YELLOWLEGS	0	1	0	0	0	0	0	0	1	1	0.25	1	1
LOGGERHEAD SHRIKE	0	0	1	0	0	0	0	0	1	2	0.25	2	2
LINCOLN'S SPARROW	2	0	0	0	0	0	0	0	0	0	0	0.25	0
MALLARD	100	25	0	50	4	6	6	25	0	210	26.25	100	100
MISSISSIPPI KITE	0	0	1	0	0	0	1	1	1	3	0.38	1	1
MOURNING DOVE	3	0	4	7	2	3	3	6	0	31	3.88	7	7
MUSKRAT	0	1	0	2	0	0	0	0	0	3	0.38	2	2
NORTHERN CARDINAL	16	13	6	13	3	6	6	2	6	65	8.13	16	16
NORTHERN FLICKER	4	4	4	9	2	4	4	7	4	38	4.75	9	9
NORTHERN HARRIER	1	0	0	1	1	0	0	0	0	1	0.50	1	1

(Continued)

Table 2 (Continued)

NORTHERN MOCKINGBIRD	5	5	8	8	2	2	2	2	2	34	4.25	8
NORTHERN ORIOLE	0	0	0	0	0	0	0	0	0	4	0.50	2
NORTHERN PARULA	0	0	0	0	0	0	0	0	0	4	0.50	2
NORTHERN PINTAIL	3	0	0	0	0	0	0	0	0	11	1.38	6
NORTHERN SHOVELER	7	4	0	0	0	0	0	0	0	11	1.38	7
NORTHERN WINGED SHALLOW	0	150	0	0	0	75	0	0	100	425	53.13	150
OPUSSUM	0	1	2	2	0	0	0	0	0	7	0.88	2
OSCHARD	0	0	0	0	0	0	0	0	0	16	2.00	6
OSPREY	0	0	0	0	0	0	0	0	0	1	0.13	1
PAINTED BUNTING	0	0	0	0	0	0	0	0	0	1	0.13	1
PAINTED GREBE	3	1	0	0	0	0	0	0	0	7	0.88	3
PINE WARBLER	2	1	0	0	0	0	0	0	0	3	0.38	2
PILEATED WOODPECKER	3	4	4	4	3	0	0	0	0	33	4.13	6
PROTHONOTARY WARBLER	0	2	9	0	0	0	0	0	0	18	2.25	9
PURPLE MARTIN	0	5	8	0	0	3	5	5	4	32	4.00	8
RACCOON	0	1	2	0	0	1	2	2	4	14	1.75	4
RED-BELLIED WOODPECKER	4	5	5	0	5	4	6	2	0	42	5.25	8
RED-EYED VIREO	0	0	0	0	0	0	0	0	0	7	0.88	5
RED-HEADED WOODPECKER	5	7	11	9	6	7	10	8	0	63	7.88	11
RING-NECKED DUCK	5	0	0	0	0	0	0	0	0	5	0.63	5
RED-SHOULDERED HAWK	1	2	3	2	1	0	0	0	0	11	1.38	3
RUFOUS-SIDED TOWHEE	2	2	0	0	0	0	0	0	0	9	1.13	4
RED-TAILED HAWK	2	1	0	1	0	0	2	2	0	10	1.25	4
RUBY-THROATED HUMMINGBIRD	0	0	1	0	0	0	1	0	0	2	0.25	1
RUSTY BLACKBIRD	50	0	0	0	50	0	0	0	0	105	13.13	50
RED-WINGED BLACKBIRD	500	20	11	200	500	25	5	100	0	1361	170.13	500
SAVANNAH SPARROW	6	0	0	0	0	0	0	0	0	9	1.13	6
SCARLET TANAGER	0	0	0	0	0	0	0	0	0	1	0.13	1
SNOWY EGRET	0	0	0	0	0	0	0	0	0	1	0.13	1
SONG SPARROW	3	0	0	0	1	0	0	0	0	4	0.50	3
SPOTTED SKUNK	0	0	0	0	0	0	0	0	0	1	0.13	1
SHARP-SHINNED HAWK	1	0	0	0	0	0	0	0	0	1	0.13	1
STRIPED SKUNK	0	1	1	0	0	0	0	0	1	3	0.38	1
SUMMER TANAGER	0	2	0	0	0	0	0	0	0	2	0.25	2
SWAMP RABBIT	1	2	2	4	0	2	1	2	0	14	1.75	4
SWAMP SPARROW	5	1	0	0	0	0	0	0	0	7	0.88	5
SWAINSON'S WARBLER	0	0	0	0	0	0	0	0	0	4	0.50	2
TREE SWALLOW	0	1000	0	1000	0	1000	0	0	1000	6000	500.00	1000
TUFTED TITMOUSE	7	7	11	6	7	4	9	0	0	57	7.13	11
VESPER SPARROW	2	0	0	0	0	0	0	0	0	2	0.25	2
WHITE-CROWNED SPARROW	4	0	0	0	2	0	0	0	0	6	0.75	4
WHITE-EYED VIREO	1	3	5	3	0	1	2	2	0	17	2.13	5
WILD TURKEY	0	2	0	0	0	0	0	0	0	2	0.25	2
WINTER WREN	1	0	0	0	0	0	0	0	0	1	0.13	1
WOOD DUCK	30	7	4	15	3	2	2	8	0	74	9.25	30
WOOD THRUSH	0	0	0	0	0	0	0	0	0	5	0.63	2
WHITE-TAILED DEER	0	0	2	0	1	0	0	1	0	22	2.75	6
WHITE-THROATED SPARROW	6	4	3	5	1	3	0	0	0	56	7.00	50
YELLOW-BILLED CUCKOO	50	6	0	0	0	0	0	0	0	16	2.00	7
YELLOW-BELLIED SAPSUCKER	1	0	6	7	0	0	1	2	0	2	0.25	1
YELLOW-CROWNED NIGHT HERON	0	0	0	0	1	0	0	0	0	19	2.38	8
YELLOW WARBLER	0	0	8	3	0	0	6	2	2	12	1.50	4
YELLOW-RUMPED WARBLER	20	24	0	0	10	2	0	0	0	54	6.75	24
TOTALS	1662	1744	365	1878	882	1350	233	1685	9799	3346		

BP24

(Continued)

Table 2 (Continued)

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(Continued)

AD-A172 575

LOWER MISSISSIPPI RIVER ENVIRONMENTAL PROGRAM REPORT 3
BIRD AND MAMMAL US (U) ARMY ENGINEER WATERWAYS
EXPERIMENT STATION VICKSBURG MS ENVIR

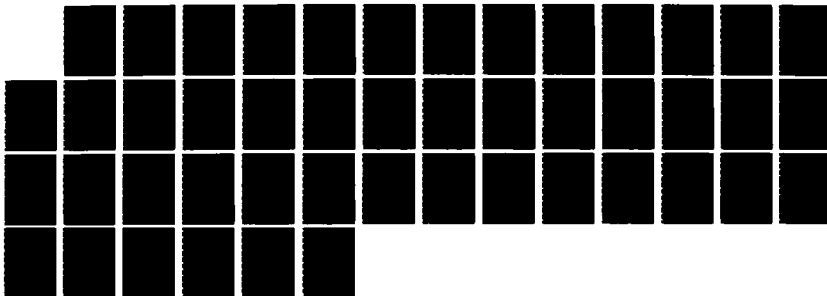
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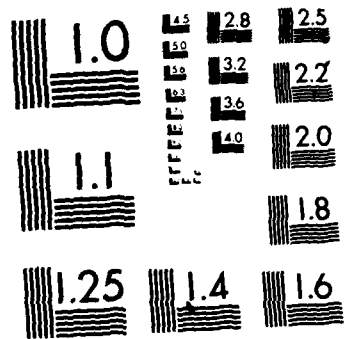
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table 2 (Continued)

RING-BILLED GULL	3	1	4	0	0	0	6	3	0	0	16	2.00	6
RED-BELLIED WOODPECKER	1	1	2	2	1	1	2	2	0	1	13	1.63	2
RED-HEADED WOODPECKER	2	0	3	0	3	0	0	2	0	0	3	0.38	3
ROCK DOVE	1	0	0	0	0	0	1	0	1	2	16	2.00	1
RUFOUS-SIDED TOMHEE	1	0	0	0	0	0	0	0	0	0	2	0.25	1
RED-WINGED BLACKBIRD	100	25	0	0	0	0	100	30	10	100	440	55.00	100
SONG SPARROW	1	0	0	25	0	0	1	0	0	0	2	0.25	1
SPOTTED SANDPIPER	2	0	0	0	0	0	2	0	0	0	4	0.50	2
SHARP-TAILED SPARROW	1	0	0	0	0	0	1	0	0	0	1	0.13	1
SWAMP SPARROW	2	0	0	0	0	0	1	0	0	0	3	0.38	2
SWAINSON'S WARBLER	0	0	0	0	0	0	0	0	0	0	2	0.25	2
TREE SWALLOW	0	0	10	2	20	0	0	20	0	20	70	8.75	20
TUFTED TITMOUSE	2	0	0	2	1	1	2	1	2	1	11	1.38	2
WHITE-CROWNED SPARROW	2	0	0	0	0	0	2	0	0	0	4	0.50	2
WHITE-EYED VIREO	1	2	2	2	1	1	0	1	0	1	8	1.00	2
WHITE-THROATED SPARROW	14	0	0	2	0	0	0	0	0	0	14	1.75	14
YELLOW-BILLED CUCKOO	0	1	1	1	0	0	0	0	1	1	4	0.50	1
YELLOW WARBLER	0	1	1	1	0	0	0	1	0	1	2	0.25	1
YELLOW-RUMPED WARBLER	18	0	0	0	0	0	9	0	0	0	27	3.38	18
TOTALS	1369	219	145	449	712	152	82	294	3422	1523			

BP25

ACADIAN FLYCATCHER	0	0	0	2	0	0	0	1	4	3	12	1.50	4
AMERICAN CROW	2	3	0	5	2	4	0	0	0	0	19	2.38	5
AMERICAN GOLDFINCH	7	0	0	0	0	0	0	0	0	0	7	0.88	7
AMERICAN KESTREL	2	1	0	1	0	1	1	0	0	1	6	0.75	2
AMERICAN ROBIN	250	0	0	0	0	5	0	0	0	0	255	31.88	250
AMERICAN WOODCOCK	2	0	0	0	0	0	0	0	0	0	2	0.25	2
ARMADILLO	0	0	0	0	0	0	0	0	0	0	1	0.13	1
BARRED OWL	1	0	1	1	0	0	0	1	0	1	5	0.63	1
BLACK-CROWNED NIGHT HERON	0	1	1	0	0	0	0	0	0	0	1	0.13	1
BEAVER	2	2	2	3	0	1	1	2	1	2	15	1.88	3
BELTED KINGFISHER	2	1	1	0	0	1	1	0	2	0	7	0.88	2
BLUE-GRAY GNATCATCHER	2	3	3	4	2	1	2	2	5	3	19	2.38	4
BROWN-HEADED COMBIRD	50	8	5	14	5	6	0	0	0	16	110	13.75	50
BANK SWALLOW	0	7	0	15	0	0	0	0	0	7	29	3.63	15
BLUE JAY	13	7	4	8	4	3	4	4	4	6	49	6.13	13
BREMER'S BLACKBIRD	3	0	0	0	0	0	0	0	0	0	3	0.38	3
BARN SWALLOW	0	12	3	6	0	0	0	0	0	10	44	5.50	12
BROWN THRASHER	2	1	2	2	2	0	0	0	4	0	7	0.88	2
CAROLINA CHICKADEE	8	9	8	11	7	3	11	8	11	10	74	9.25	11
CATTLE EGRET	0	6	4	4	2	0	0	0	0	6	31	3.88	7
CAROLINA WREN	2	2	2	3	0	0	0	2	2	0	15	1.88	3
CERULEAN WARBLER	0	1	0	0	0	0	0	0	0	0	1	0.13	1
CHIPPING SPARROW	1	0	0	0	0	0	0	0	0	0	1	0.13	1
CHIPMUNK SWIFT	0	0	0	8	9	0	0	0	4	0	21	2.63	9
COMMON GRACKLE	500	13	50	50	50	500	0	50	44	100	1307	163.38	500
COMMON NIGHTHAWK	0	0	0	0	0	0	0	0	0	1	2	0.25	1
COMMON YELLOTHROAT	2	2	5	3	5	0	0	0	2	2	16	2.00	5
DOMESTIC OR FERAL DOG	2	2	0	2	2	1	1	2	2	2	14	1.75	2
DOWNY WOODPECKER	2	0	0	1	0	0	0	0	0	0	13	1.63	2
EASTERN BLUEBIRD	2	1	0	0	0	0	0	0	0	0	2	0.25	2
EASTERN COTTONTAIL	1	1	2	0	0	0	0	0	1	0	5	0.63	2
EASTERN KINGBIRD	0	0	0	1	0	0	0	0	0	0	1	0.13	1
EASTERN MEADOWLARK	0	2	2	0	2	0	0	2	0	2	8	1.00	2

(Continued)

Table 2 (Continued)

[illegible]

(Continued)

Table 2 (Concluded)

WHITE-EYED VIREO	2	2	4	2	1	1	0	2	14	1.75	4
WINTER WREN	1	0	0	0	0	0	0	0	1	0.13	1
WOOD THRUSH	0	0	2	2	0	0	2	1	7	0.88	2
WHITE-THROATED SPARROW	27	0	0	0	3	0	0	0	30	3.75	27
YELLOW-BILLED CUCKOO	0	2	4	4	0	1	1	2	14	1.75	4
YELLOW-BELLIED SAPSUCKER	2	0	0	0	0	0	0	0	2	0.25	2
YELLOW-RUMPED WARBLER	27	0	0	0	16	0	0	0	43	5.38	27
YELLOW-THROATED WARBLER	0	0	2	0	0	0	2	2	6	0.75	2
TOTALS	1158	211	230	314	712	195	177	319	3316		1355
TOTALS											
TOTAL OBSERVATIONS	37271	15799	8006	25144	25148	14722	5905	23394	155389		57896

Table 3
Bird Species Nesting at the 26 Borrow Pits Studied Along the Lower Mississippi River Levee System, 1981-1983*

Bird Species (Alphabetized Within Groups)	BP1	BP2	BP3	BP4	BP5	BP6	BP7	BP8	BP9	BP10	BP11	BP12	BP13	BP14	BP15	BP16	BP17	BP18	BP19	BP20a	BP20b	BP21	BP22	BP23	BP24	BP25	Totals
Cavity Nesters (n = 17)																											
American kestrel	-	-	-	-	-	-	-	-	-	-	1/1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1/1
Barred owl	-	1/1	-	-	-	-	-	-	-	-	1/1	-	-	-	-	-	-	-	1/1	-	-	-	-	1/1	-	-	4/4
Carolina chickadee	7/5	8/7	-	8/6	5/6	4/4	7/6	3/3	6/7	2/2	11/13	3/2	2/1	4/4	3/4	3/3	6/7	3/4	1/2	1/1	2/1	3/2	6/6	9/10	3/2	4/5	114/113
Carolina wren	4/3	2/1	-	4/1	2/2	2/1	3/1	1/1	1/2	1/-	5/3	-	1/-	2/1	2/2	1/1	2/1	1/-	1/1	1/-	2/-	2/1	2/-	4/-	1/-	2/1	49/23
Downy woodpecker	1/1	1/2	-	1/1	2/2	1/1	1/1	1/1	1/2	1/1	4/3	1/1	-1/1	1/-	1/1	1/1	2/2	1/2	1/1	1/1	-	1/1	3/2	3/4	-	1/1	31/33
Eastern bluebird	3/4	-	-	3/2	-	-	1/2	2/3	-	-	5/6	-	1/2	-1/1	-	2/3	-	-	-	-	-	-	-	1/1	-	-	18/24
Eastern screech-owl	1/2	-	-	1/1	1/1	-	1/-	-	1/1	-	2/1	-	-	-	-	-	1/-	-1/1	-	-	-	-	1/1	1/1	-	-	10/9
European starling	15/4	-	-	11/8	-	-	10/12	4/5	-	-	-	-	-	-	-	-	-	6/5	-	-	-	-	-	-	3/5	-	49/39
Great-crested flycatcher	1/1	1/2	-	1/1	1/2	1/-	2/1	-	1/1	-	3/2	-	-	1/-	1/2	-	1/2	-	1/1	-	1/-	-1/1	2/2	2/1	-	1/1	21/19
Hairy woodpecker	2/1	2/2	-	2/2	2/1	1/1	2/2	1/1	2/3	1/1	4/3	1/1	1/-	1/1	1/1	1/1	2/2	1/1	-1/1	1/1	-	1/-	3/3	4/3	1/1	2/3	39/36
Northern flicker	2/2	1/1	-	2/3	1/2	1/1	1/1	1/1	2/1	-	3/3	1/1	1/1	2/1	1/2	-	2/2	-	1/1	1/-	-	1/-	1/1	2/3	-	-	27/28
Pileated woodpecker	1/2	1/1	-	1/1	1/1	-	1/1	-	1/1	-	1/1	-	-	1/1	1/1	-	-	1/1	-	1/1	-	-	1/1	2/3	-	-	14/16
Prothonotary warbler	4/5	2/1	-	3/2	1/-	2/1	3/2	1/1	2/1	1/-	4/6	-	-	3/2	1/2	-	2/2	3/1	1/1	1/-	-	2/2	2/1	4/2	-	5/1	47/33
Red-bellied woodpecker	3/4	2/2	-	3/3	2/1	1/1	4/4	1/1	2/3	1/1	3/3	1/1	1/1	2/2	1/2	1/1	1/1	1/1	2/2	1/1	1/1	1/1	3/2	4/3	1/1	3/3	46/46
Red-headed woodpecker	4/4	2/3	-	4/3	2/2	2/1	5/4	2/2	2/2	1/1	4/5	2/2	1/-	2/3	4/4	1/1	1/2	1/1	2/2	1/1	-1/1	1/1	2/2	5/5	1/-	4/3	56/55
Tufted titmouse	6/5	2/2	-	2/2	2/2	1/2	3/3	1/1	3/3	1/2	5/5	1/1	1/1	2/2	3/2	-	3/2	2/2	1/1	1/1	-	1/2	3/2	5/4	1/1	2/3	52/51
Wood duck	2/1	1/-	-	1/2	-1/1	-	2/2	-	1/-	-	3/2	-	-	1/-	1/1	-	1/1	2/1	-	2/2	-	-	-	2/1	-	-	19/14
Colony Nesters (n = 8)																											
Anhinga	2/-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2/1	-	-	-	-	-	-	-	-	4/1
Black-crowned night heron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2/-	-	-	2/-
Cattle egret	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8/6	-	-	8/6
Common grackle	-	3/4	-	3/-	2/-	6/2	5/-	-	10/2	34/14	2/3	-	-	6/11	14/15	-	-	7/-	6/8	3/-	6/-	-	-	-	-	21/18	128/77
Great blue heron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2/-	-	-	2/-
Green-backed heron	1/-	-	-	-	-	-	2/1	-	-	-	2/-	-	-	1/2	-	-	-	1/-	-	-	-	-	-	3/2	2/2	2/1	13/7
Little blue heron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2/2	-	-	2/2
Yellow-crowned night heron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3/3	-	-	3/3
Other Tree Nesters (n = 24)																											
Acadian flycatcher	3/2	1/1	-	1/-	2/1	-	1/1	-	2/2	-	1/2	-	-	1/1	-	-	1/-	2/1	-	1/1	-	-	2/2	3/2	-	1/2	22/18
American crow	-	-	-	-	1/-	-	-	-	-	-	-	-	-	1/-	-	-	-	1/1	-	-	-	-	1/1	-	-	-	4/2
Blue-gray gnatcatcher	2/1	1/-	-	2/3	1/-	-	-1/1	-	2/2	1/1	2/1	-	-	-1/1	2/1	-	1/1	1/-	-	-1/1	-	1/-	1/1	2/3	-	2/1	21/18
Blue jay	4/1	2/1	-	2/1	2/2	1/-	1/-	1/1	2/-	-	3/4	-	1/2	2/3	1/1	-	2/2	-	1/2	-	-	1/1	3/1	2/3	1/1	2/2	34/28
Cerulean warbler	-	1/-	-	1/1	1/1	-	-	-	-	-	1/2	-	-	1/-	-	-	1/-	-	1/1	-	-	-1/1	-	1/1	-	-	8/9

(Continued)
* Numbers represent nests found or pairs or broods observed, not total birds. Two years are indicated with the slash mark for each species at each borrow pit. Totals within species for each year are indicated in the last column of numbers.

Table 3 (Continued)

Bird Species (Alphabetized Within Groups)	BP1	BP2	BP3	BP4	BP5	BP6	BP7	BP8	BP9	BP10	BP11	BP12	BP13	BP14	BP15	BP16	BP17	BP18	BP19	BP20a	BP21	BP22	BP23	BP24	BP25	Totals	
Other Tree Nesters (n = 25) (Continued)																											
Eastern kingbird	2/-	-	-	-	-	-	-	-	-	-	1/-	-	-	-	-	-	1/1	-	-	-	1/-	-	-	-	-	5/1	
Eastern wood-pewee	2/2	1/1	-	1/2	1/1	1/2	1/1	1/1	1/2	1/1	3/3	1/1	-1	3/4	2/2	-	1/2	1/1	1/1	1/1	2/2	2/1	3/3	-	1/1	32/33	
Gray catbird	1/-	-	-	1/1	-	-	-	-	-	-	-1	-	-	1/-	-	-	-1	-	1/1	-	1/2	1/-	-	-	-	6/6	
Hooded warbler	1/-	3/1	-	1/-	2/2	-	1/-	-	1/1	3/2	-	3/2	-	2/2	-	-	1/1	2/-	-	1/-	-	3/-	-	2/-	-	23/9	
Indigo bunting	4/2	2/2	-	3/3	5/6	2/1	2/1	1/1	3/2	1/1	3/2	1/1	1/-	2/2	3/2	1/-	2/1	2/-	1/1	1/1	1/2	3/2	4/1	-	2/2	50/36	
Mississippi kite	-	-	-	-	1/-	-	-	1/1	-	1/1	-	-	-	-	-	-	-	-	-	-	1/-	-	-	1/1	-	5/3	
Mourning dove	3/3	1/1	-	1/1	1/1	-	-	1/1	2/1	-	3/2	1/1	1/1	2/1	2/1	1/2	1/1	-	1/-	-	1/-	1/2	1/-	-	-	24/19	
Northern oriole	1/2	1/-	-	-	1/1	-	-	1/1	1/1	-	1/2	1/-	-	1/1	-	-	1/1	1/-	-	-	-	1/-	1/1	1/-	1/-	12/10	
Northern parula	1/1	1/1	-	-	1/-	-	-	-	-	3/2	-	-	-	-	-	-	1/1	1/-	-	-	1/1	2/1	1/1	1/1	-	13/9	
Orchard oriole	4/3	2/2	-	1/2	2/1	2/1	1/1	1/1	2/1	1/-	4/5	1/1	-	3/2	2/2	1/1	2/2	1/-	1/1	1/1	1/1	2/1	3/3	-	1/1	41/34	
Painted bunting	1/1	2/2	-	3/1	1/1	-	-	1/2	1/-	-	1/-	-	-	-	-	-	1/1	-	1/1	-	1/-	-	-	-	-	11/9	
Red-eyed vireo	1/1	1/1	-	1/-	2/1	1/-	1/-	1/1	2/1	-	4/2	-	-	3/2	1/2	1/1	2/3	1/-	1/1	-	1/-	1/1	3/3	2/1	-	32/22	
Red-shouldered hawk	-	-	-	-	-	-	1/1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1/1	-	-	2/2	
Red-winged blackbird	13/3	2/1	2/-	10/-	6/-	7/2	5/-	4/-	7/1	3/1	12/3	2/-	4/1	7/4	5/8	9/2	8/6	4/-	5/3	2/-	3/-	4/2	2/-	6/1	11/3	7/5	150/46
Savannah warbler	-	-	-	-	1/-	-	1/-	-	1/-	-	1/-	-	-	-	-	-	-	1/-	-	-	-	-	-	1/1	1/-	-	6/1
White-eyed vireo	2/2	2/1	-	2/1	1/-	1/-	2/-	1/-	1/1	1/-	3/2	-	-	1/1	1/-	-	-	1/-	1/-	-	1/-	1/1	2/-	2/1	1/-	2/-	29/9
Yellow-billed cuckoo	4/1	2/-	-	3/-	1/-	1/-	2/-	1/-	2/1	1/-	2/1	1/-	1/1	2/2	2/1	1/-	1/2	2/-	1/1	-	1/-	1/1	2/-	3/-	-	2/-	39/11
Yellow-throated warbler	-	2/1	-	1/1	-	-	-	-	-	-	1/1	-	-	-	-	-	-	-	-	-	1/1	-	-	-	-	1/1	6/5
Yellow warbler	1/-	-	-	-	-	-	-	-	-	-	1/1	-	-	2/1	-	-	1/1	-	1/-	-	-	-	2/2	-	-	-	8/5
Shrub Nesters (n = 9)																											
Blue grosbeak	-	1/-	-	-	-	-	-	-	-	-	1/-	-	-	1/1	-	-	1/1	-	-	-	1/1	-	-	-	-	5/3	
Brown thrasher	-	-	-	1/-	-	1/-	-	-	-	-	2/2	-	-	1/1	1/-	-	1/1	-	-	-	1/-	1/1	2/-	1/-	-	1/-	13/5
Common yellowthroat	4/2	3/2	-	4/1	2/1	2/1	4/2	2/1	5/2	1/-	6/3	2/1	-	2/2	3/1	1/1	3/3	2/-	1/1	1/-	2/-	1/-	3/2	1/-	2/1	59/29	
Field sparrow	-	1/-	-	-	-	-	-	-	1/-	-	-	-	-	4/1	-	-	1/2	-	2/1	-	3/2	-	1/-	-	-	13/6	
Loggerhead shrike	1/-	-	-	-	-	-	1/1	1/-	-	-	-	1/-	1/1	1/1	-	1/-	1/1	-	1/1	-	-	-	-	-	-	9/5	
Northern cardinal	8/3	2/-	-	3/1	2/2	1/-	1/-	1/1	2/1	-	4/1	1/1	2/1	3/-	2/-	-	3/2	-	1/1	-	2/1	2/2	2/1	3/1	1/1	3/1	49/20
Northern mockingbird	3/1	1/-	-	2/-	2/2	1/1	1/-	1/1	3/-	1/-	4/2	2/1	3/2	2/1	2/-	1/-	2/2	-	1/1	-	1/-	2/1	4/1	1/-	2/1	44/17	
Rufous-sided towhee	1/-	-	-	-	-	-	1/-	-	1/-	-	3/1	1/-	-	1/-	-	-	1/1	-	1/1	-	1/-	-	2/-	-	1/-	14/3	
Wood thrush	1/-	1/-	-	1/1	1/1	-	-	-	1/-	-	1/1	-	-	1/-	-	-	1/1	-	1/-	-	1/2	1/1	1/1	-	1/1	13/9	
Large Nesters (n = 5)																											
Eastern meadowlark	3/-	1/2	2/1	2/2	2/1	2/1	1/2	1/-	-	1/-	1/1	1/2	-	1/1	2/1	1/2	3/4	2/2	-	3/2	-	1/1	3/3	2/-	-	1/-	35/27
Horned lark	1/1	-	-	-	-	-	-	-	-	-	1/-	-	-	3/2	-	-	2/3	-	2/2	-	-	3/2	-	-	-	-	12/10
Killdeer	2/1	1/-	2/2	-	-	-	-	-	-	-	-	-	-	1/2	-1	-	1/2	-	-	-	-	-	-	-	-	10/8	
Northern bobwhite	2/-	2/1	1/2	-	-	-	-	-	-	-	1/1	-	1/-	-	-	1/-	1/2	-	2/1	-	1/1	-	1/-	-	-	13/8	
Pied-billed grebe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1/-	

(Continued)

(Sheet 2 of 3)

Table 3 (Concluded)

Bird Species (Alphabetized Within Groups)	BP1	BP2	BP3	BP4	BP5	BP6	BP7	BP8	BP9	BP10	BP11	BP12	BP13	BP14	BP15	BP16	BP17	BP18	BP19	BP20a	BP20b	BP21	BP22	BP23	BP24	BP25	Totals
Other Ground Nesters (n = 3)																											
Kentucky warbler	-	-	-	-	1/-	-	-	-	-	-	1/-	-	-	1/-	-	-	1/-	-	-	-	-	1/1	-	1/-	-	-	6/1
Mallard	1/-	-	-	-	-	-	-	-	-	-	-	-	-	1/1	-	-	3/1	-	-	-	-	-	-	-	-	-	5/2
Wild turkey	-	-	-	1/-	-	-	-	-	-	-	1/-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2/-
Others (n = 1)																											
Brown-headed cowbird	(species present year-round at all borrow pit sites and assumed to be laying eggs in other birds' nests)																										
Totals across all pits (n = 67)	1982: 1,645 nests found 1983: 1,133 nests found																										

APPENDIX A: INDIVIDUAL BORROW PIT DESCRIPTIONS, INCLUDING
PERTINENT BIRD, MAMMAL, AND PLANT OBSERVATIONS

Borrow Pit 1

1. BP1 is located 6 miles southwest of Delta, La., on Kents Island, at river mile (RM) 431 in Madison Parish. Like most of the pits in this study, it adjoins the river levee. BP1 is 0.9 mile from the river and floods at least yearly. In 1981-1983, it was flooded during four of the eight sampling periods. Measurements for BP1 and each of the borrow pits are given in Table A1.*

2. There are 10 islands with trees inside BP1, and bottomland hardwoods between the pit and the river. A hunting club controls the land behind the pit, and Bayou Plantation controls the levee area. The hunting club plants food plots of winter wheat each year between the pit and river, primarily for white-tailed deer use. Bayou Plantation sometimes cuts the levee vegetation, predominantly Johnson grass and Bermuda grass, for hay and sometimes pastures cattle on the levee. The land across the levee is usually all planted in soybeans; in 1983 it was so wet that much of that land remained flooded and fallow. The entire pit area is posted against all trespassing.

3. Approximately 30 percent of BP1 is less than 12 inches deep at bank-full, although the area next to the levee is permanent deep water. About 10 percent of the shallow water has floating or rooted aquatic plants. Snags, buttonbushes, and brush occur in or near the shallow-water areas.

4. Primary woody vegetation consists of intermixed areas of black willow, bald cypress, sugarberry, buttonbush, eastern cottonwood, box elder, water hickory, American elm, American sycamore, green ash, swamp privet, roughleaf dogwood, and rose mallows. An occasional water locust, honey locust, persimmon, American elderberry, buckthorn bumelia, deciduous holly, or red maple was found. Every vine that commonly occurs inside the levees was present, and numerous perennial grasses and forbs occurred both on the levee slope and around the pit. Dewberries were fairly abundant in unmowed areas.

* Pool area, shoreline lengths, and other measurements were made with a CALCOM 9000 Digitizer at WES.

Table A1
Measurements of the 26 Study Borrow Pits Using a CALCOM 9000 Digitizer

Borrow Pit	Pool Area	Islands	Total Area	Open			Open Fields	Bottomland	Willows/ Cottonwoods	Distance	Shoreline	Shoreline
	at Bankfull	and Berms		Observed	Scattered	Pasture						
	acres	acres	acres	acres	acres	acres	acres	acres	acres	miles	feet	Index
1	77.71	22.84	168.77	0.00	21.44	3.62	11.32	31.83	0.90	34,354.8	5.34	
2	33.53	0.00	82.37	0.00	4.30	0.00	32.08	12.45	2.50	10,541.4	2.49	
3	19.94	0.00	42.19	0.00	22.26	0.00	0.00	0.00	0.30	8,084.8	2.48	
4	29.48	0.03	74.13	2.35	10.83	0.00	22.15	9.29	0.40	11,407.3	2.88	
5	26.67	10.60	79.15	0.00	13.99	0.00	26.66	1.23	0.20	19,035.3	5.05	
6	14.41	10.75	44.66	0.00	5.36	0.00	0.00	14.15	1.30	11,332.6	4.09	
7	15.84	3.72	30.98	0.00	1.27	0.00	6.75	3.41	1.00	7,717.6	2.66	
8	14.03	0.20	30.59	11.93	4.43	0.00	0.00	0.00	0.30	9,264.6	3.39	
9*	--	--	--	--	--	--	--	--	0.90	--	--	
10	7.68	0.00	19.04	7.89	3.47	0.00	0.00	0.00	0.05	3,187.3	1.57	
11	91.07	4.46	134.23	0.00	2.80	6.02	29.89	0.00	3.60	32,702.7	4.69	
12	28.05	2.94	68.09	0.00	30.06	0.00	0.00	7.05	0.80	16,437.0	4.25	
13	20.09	0.00	42.31	3.46	18.76	0.00	0.00	0.00	0.35	4,163.9	1.27	
14*	--	--	--	--	--	--	--	6.30	--	--	--	
15	39.77	32.60	155.32	0.00	1.07	0.00	8.51	73.37	1.00	20,822.5	4.52	
16	39.22	1.46	74.22	0.75	32.79	0.00	0.00	0.00	0.20	21,364.8	4.67	
17*	--	--	--	--	--	--	--	--	3.00	--	--	
18	12.74	0.10	26.70	0.00	2.61	0.00	8.82	2.44	1.80	6,239.9	2.39	
19	9.41	5.51	38.64	0.00	4.16	2.73	4.00	12.84	0.80	8,258.2	3.69	
20a	6.44	0.00	20.38	0.00	0.25	0.00	0.35	13.35	0.30	3,891.7	2.10	
20b	6.05	0.00	17.73	0.00	2.90	0.00	0.00	8.77	0.30	2,777.8	1.55	
21	5.60	2.25	32.55	0.00	2.21	2.34	7.09	13.08	2.20	6,686.8	3.87	
22	8.30	0.20	27.68	0.00	4.02	0.00	15.40	0.00	0.60	5,587.4	2.66	
23	9.31	4.00	34.70	0.00	0.00	0.00	17.10	4.33	1.20	6,412.1	2.88	
24	15.20	3.51	74.08	0.00	10.80	0.00	0.25	44.33	0.05	15,170.2	5.33	
25	23.94	0.00	54.70	0.00	7.47	0.00	8.59	14.70	0.20	12,424.3	3.48	

* Aerial photographs not available for measurement.

5. The pit receives heavy use from all groups of birds. Songbird use is significant. Waterbirds frequent the pit, especially great blue herons and great egrets year-round, and anhingas, green-backed herons, little blue herons, and snowy egrets in summer. Migrating Caspian terns and wood storks were seen on BP1 in 1983. Waterfowl use was not as great as had been expected; however, several species of ducks were found in winter, and a pair of mallards raised three ducklings there in 1982. Wood ducks nested at BP1 both study years.

6. Barred and eastern screech-owls were common in the woods behind the pit and hunted over the pit area. Most of the species of cavity nesters expected to occur in the Lower Mississippi River Valley occur at BP1, and all summer resident/year-round cavity-nesting species nested there both study years. Raptor use of the open area was especially heavy in the winter months by red-tailed hawks, northern harriers, and American kestrels, and Mississippi kites were commonly seen in summer. Shorebirds also used the pit area, and swallow species were abundant during migration. Northern bobwhite coveys were found around the pit.

7. Many white-tailed deer live in the pit area; during low flood stages they congregated on a high area in the woods behind BP1. During extremely high water in 1983, they crossed over the levee and lived in the open fields until the water receded and the browse vegetation regenerated.

8. Beavers and nutria were observed living in the pit in 1982; in 1983 high water apparently caused the nutria to move, but the beavers remained in about the same numbers. Other mammals found at BP1 include both black and red fox squirrels, opossums, raccoons, striped skunks, eastern cottontails, swamp rabbits, and coyotes.

9. Cattle, and their nearly year-round associates, cattle egrets, were abundant on parts of the levee occasionally and at the northern end of BP1. Cattle egrets remained as far north as Lake Providence, La., the entire winter of 1982-1983 because of the very mild winter.

10. In winter 1981-1982, hunter use of BP1 was heavy, and four-wheel drive vehicles, horses, and dogs were often around. In winter 1982-1983, the river water was so high that the hunting season inside the levees in Louisiana was closed and very little hunting occurred. According to local fishermen, the fishing is excellent in BP1.

Borrow Pit 2

11. BP2 is located 6 miles southeast of Newellton, La., near Coffee Point and Yucatan Bend, at RM 407 in Tensas Parish. It is across the river from the Grand Gulf Nuclear Power Plant (under construction) and the mouth of the Big Black River. The pit adjoins the river levee. BP2 is 2.5 miles from the river and floods at least yearly. In 1981-1983 it was flooded during three of the eight sampling periods. This is not the pit sampled for fish, as the WES field crew was denied access to this designated pit for fisheries work.

12. BP2 is very long and narrow and, when full of water, is about 6 feet deep at bankfull. The pit dried out to approximately 10-percent capacity in the winter of 1981-1982 and was drying out in fall 1983 at the last sampling period. A series of observation point photographs show seasonal variations in water levels. There are no islands in BP2, but it is surrounded on three sides by trees. The bottomland hardwood stands between the river and pit are of outstanding quality. The trees on the levee side of BP2 are almost totally eastern cottonwoods, with the rest black willows and American sycamores.

13. Winter Quarters Hunting Club owns the pit and 10,000 acres between the river and the levee; this is an exclusive 20-member club made up of New Orleans professional men who hire a full-time manager. They maintain a camp, fishing boats, permanent deer stands, and roads around the pit, as well as a pier into the pit. The pit levee slope is ungrazed and is baled twice each summer for hay by an adjoining landowner. Levee vegetation is predominantly Johnson and Bermuda grasses. The club manager and his staff plant numerous food plots of winter wheat, millet, and legumes throughout the 10,000 acres. Land across the levee is usually all planted in large fields of soybeans. The entire pit area is posted and patrolled by the manager and his staff.

14. Approximately 30 percent of the water is less than 12 inches deep at bankfull; almost no aquatic plants occur in the pit. The water is free of snags and vegetation. However, shrubby growth hangs over the banks.

15. The better bottomland hardwood stands occur away from the pit, closer to the river. However, on the riverside of BP2 red maple, sweet gum, green ash, overcup oak, tupelo gum, Nuttall oak, American elm, slippery elm,

hickories, persimmon, silver maple, deciduous holly, swamp privet, and rose mallows are found. An occasional roughleaf dogwood, sugarberry, eastern cottonwood, or honey locust occurs. Numerous vines and herbaceous plants occur on all sides, and understory is dense. Annual elder and common ragweed are two of the most common herbaceous plants away from the wooded areas.

16. BP2 receives good bird use, primarily by songbirds. In summer months, anhingas, double-crested cormorants, little blue herons, and green-backed herons are common; great egrets and great blue herons occur year-round. Little use by waterfowl other than a few wood ducks occurred during the 2-year study. Swallows were very common in migration, and barn swallows fed over the pit all summer.

17. Red-tailed hawks, red-shouldered hawks, northern harriers, and American kestrels were common. Mississippi kites were seen often in summer, and migrating broad-winged hawks were observed in spring. Cavity-nesting species occurred here year-round, except yellow-bellied sapsuckers which overwintered. Wild turkeys and northern bobwhites were managed by the hunting club, and turkey populations were very good. American woodcocks were also found at BP2 in winter.

18. The most abundant white-tailed deer use of any pit occurred at BP2. The club manager stated that they averaged one deer per 10 to 15 acres, a very high carrying capacity, over the 10,000 acres. Large groups of deer were observed in all sampling periods; the most seen in one herd was in winter 1981-1982, when 29 were seen together crossing through the pit and up the levee to feed in the fields. Farmers in the area complain regularly that the large deer population is damaging their crops, but since hunting pressure is very light, no real population control is being carried out at the present time.

19. Black bear tracks and scratches were found in the woods at BP2, and bobcat tracks have also been seen and pointed out by the club manager. Coyotes in pairs and small groups were observed frequently, as they traveled the pit roads and levee with no apparent fear of humans; they undoubtedly take advantage of the abundant deer population as a food supply.

20. One family of beavers lived in BP2 along the riverside bank. Other mammals observed on a regular basis were fox squirrels, opossums, raccoons, striped skunks, swamp rabbits, and eastern cottontails. Occurrence of both

rabbits at borrow pits was very common, with cottontails at the wetter pits on and close to the levee and swamp rabbits inhabiting the areas behind the pits.

21. Since there is little fishing pressure at this pit and regular overflow occurs, fish catches and size of fish are excellent. The blue gills caught during the 2 years of the study were by far the largest in both size and number of any pit in fishermen's catches. Largemouth bass were also both numerous and very large in the catches observed.

Borrow Pit 3

22. BP3 is located opposite Cottonwood Bar on old Island No. 97, 1 mile south of Transylvania, La., at RM 470 in East Carroll Parish. It adjoins the river levee and is only 0.3 mile from the river. It floods at least yearly, and in 1981-1983 was flooded during three of the eight sampling periods.

23. BP3 appears to have originally been intended to become a body of water approximately 5 to 6 feet deep. It was constructed in the summer of 1981 by the USAED, Vicksburg, and during the first two sampling periods was almost totally devoid of vegetation with the exception of perennial rye that had been planted on the levee slope for stabilization. In the summer of 1982, after the third sampling period (June), the landowners cut deep ditches through this and nearby borrow pits and drained off the water. They also planted the most shallow pit areas in soybeans which were never harvested due to wet conditions. In 1983 they reditched this and other pits and, at the last sampling period in fall 1983, almost no water was being retained behind the Corps-built berms that had been cut by the landowners.

24. Ninety percent of BP3 dries out and/or is drained by the ditches; there were no aquatic plants, but nutsedges are common in the soft mud of the drained pit. Over the 2-year study, the vegetation ranged from 100 percent bare ground to small black willow and eastern cottonwood sprouts which were bulldozed away in the fall of 1983. The predominant vegetation is nutsedges, cocklebur, buttercup, morning glories, spiny amaranth, other colonizer species, and the Bermuda, Johnson, and rye grasses planted on the levees by the Corps.

25. Under the above-cited circumstances, it is probably surprising to find that some songbirds, primarily mourning doves, horned larks, eastern

meadowlarks, rock doves, common grackles, savannah sparrows, and red-winged blackbirds, commonly occurred here. The most important use of BP3 was during low-water stages after ditching, before the pit dried out. Great blue herons, great egrets, white ibises, little blue herons, snowy egrets, green-backed herons, and other waterbirds frequently fed at this pit. During fall and spring migration, mallards, wood ducks, blue-winged teal, and other ducks were noted in fair numbers. Dowitchers, sandpipers, and other migrating shorebirds also used the mudflats, and killdeer occurred year-round. Northern bobwhites were also found regularly in the pit area.

26. Raptor use of the open area ranged from a Harlan's hawk (now considered a race of red-tailed hawk) that was undoubtedly out of its range during the extremely cold winter in 1981-1982, to the more common red-tailed hawks, American kestrels, and northern harriers. Both summers, Mississippi kites were observed hunting over the area, and a pair nested in a large tree across the levee. Migrating tree and other swallows were abundant in the spring, and barn swallows and purple martins fed over the pit each summer.

27. There was practically no mammal use of the pit with the exception of dogs from nearby houses and an occasional raccoon, opossum, and striped skunk. Eastern cottontail sightings increased in 1983 over 1982; no swamp rabbits were observed. No fishing occurred at this pit.

Borrow Pit 4

28. BP4 is located near Point Lookout and Fitler Bend, 4 miles southeast of Lake Providence, La., at RM 482 in East Carroll Parish. It adjoins the river levee and is an older pit surrounded by woody vegetation on four sides. It floods at least yearly, and in 1981-1983 was flooded during three of the eight sampling periods. BP4 is only 0.4 mile from the river.

29. There are no islands in BP4, but a few buttonbush stands occur in the shallowest sections. There are numerous snags in and around the pit, and large hardwood trees occur in a fringe around the pit. About 200 feet behind the pit, between it and the river, a cottonwood plantation was planted about 7 years ago, and an old earthen dike designed to keep deer away from the young trees still remains around the plantation.

30. Land across the levee is all planted in cotton. The landowners have the pit posted to hunting but allow unlimited fishing by local citizens.

During six of the sight sampling periods at least one boatful of fishermen was in the pit. It was common in pleasant weather to find no less than 5 to 10 people at any given time fishing from boats and the bank.

31. During the 1983 flood, a barge lost from a tow was floating in the pit, jammed in the trees; it was removed before the water receded. Here, as with all pits south of Memphis, the water stayed over the vegetation for such a long period that virtually all plants lost their foliage 12 to 20 feet high, including all grasses and herbaceous plants. There was no browse or places for ground-feeding animals for over 4 months north of Vicksburg and up to 6 months south of Vicksburg around the pits.

32. Approximately 25 percent of the pit is less than 12 inches deep at bankfull, and about 20 percent had floating or rooted aquatics in 1982, primarily duckweeds and pondweeds. Aquatic plant occurrence was much less in 1983. This pit has permanent water year-round even in drought.

33. Primary woody vegetation surrounding the pit consists of American sycamore, eastern cottonwood, green ash, sugarberry, box elder, deciduous holly, osage orange, swamp privet, hickories, overcup oak, water locust, honey locust, slippery elm, black willow, bald cypress, willow oak, and others. Much of the understory is very heavily grazed by cattle, and the levee side of the pit is overgrazed, with even the trees having their lower limbs browsed as high as possible. On the river side of the pit that is not accessible to cattle, dewberries, peppervine, greenbriers, lady's ear drops, poison ivy, grapes, supple-jack, and other vines, shrubs, and herbaceous understory are very dense. Deer browse signs were noted here but were not distinguishable from cattle browse in places accessible to the cattle herd.

34. BP4 receives heavy use by birds of all groups. Mixed blackbird flocks were found year-round, and in 1982-1983 cattle egrets remained throughout the winter due to the mild weather. Use by cavity nesters, raptors, and swallows was consistent with BP1 and BP2. Waterbirds, especially great blue herons, great egrets, green-backed herons, and little blue herons, fed in the pit. In late summer months when the water was at its lowest level, great egrets were abundant in the shallow-water areas, with up to 100 birds being counted in some spots.

35. Mallards and wood ducks were the primary waterfowl seen in the pit, and wood duck broods were seen both summers. Migrating shorebirds included dowitchers, sandpipers, and greater yellowlegs. Wild turkeys and northern

bobwhites both occurred here, and turkeys were seen in flocks of as many as 17 birds.

36. The most unusual bird sighting at BP4 was in fall 1983. A greater roadrunner was seen dashing down the levee slope, and the sighting was hard to believe until local birders confirmed that roadrunners had been introduced to East Carroll Parish and were year-round residents.

37. White-tailed deer use was noted during all nonflooded sampling periods. During high water they converged on higher spots behind the levee or crossed over to the cotton fields. During high-water stages, deer were often noted swimming or running through backwater areas.

38. Two families of beavers lived in BP4 in 1982; in 1983 only one group remained after high water. Other mammals noted in BP4 with regularity were striped skunks, swamp rabbits, eastern cottontails, opossums, raccoons, coyotes, and fox squirrels.

Borrow Pit 5

39. BP5 is located near Willow Cutoff, 5 miles north of the Madison Parish River Port (opposite Eagle Lake), at RM 462 in southern East Carroll Parish. It adjoins the river levee and is only 0.2 mile from the river. It floods at least yearly and in 1981-1983 was flooded four of the eight sampling periods. In the winter of 1981-1982, the pit dried out completely and the landowner planted the south end in winter wheat. It is relatively shallow over 80 percent of its area and has almost no aquatic plants.

40. BP5 has 23 small islands with trees and some bottomland hardwoods between the pit and the river. There are no woody plants occurring on the levee side of the pit. The entire pit area is heavily grazed by cattle and horses; approximately 100 feet behind the pit a fence separates the cattle from land controlled by Mascot Hunting Club, where relatively undisturbed bottomland hardwoods occur. There is very little understory in the grazed portion. Vegetation on the levee slope is almost entirely closely cropped Bermuda grass. Land across the levee is planted in soybeans.

41. Primary woody vegetation in the pit area is black willow, with occasional red maple, green ash, American sycamore, swamp privet, sugarberry, rose mallows, buttonbush, pecan, persimmon, honey locust, box elder, Nuttall oak, and others. On the slope of the wing levee extending at the south end of the

pit, black walnut, black cherry, and basswood also occur. Some dewberries and vines occur but are heavily grazed.

42. BP5 receives a diversity of bird use, and songbirds of open country and woods are all found here. Great egrets were abundant during low-water periods. Great blue herons, cattle egrets, green-backed herons, little blue herons, snowy egrets, and other waterbirds were also found. Waterfowl use was limited to blue-winged teal and wood ducks. Barred and eastern screech-owls were observed and heard with regularity. Red-tailed hawks, red-shouldered hawks, northern harriers, and American kestrels frequently hunted the area, and Mississippi kites nested in a tree at a pit in 1982. Swallows of every species occurring in the Mississippi Flyway migrated past BP5, and barn swallows and chimney swifts fed here each summer. Northern bobwhites and wild turkeys were never heard or sighted at BP5. The usual cavity nesters all occurred here in abundance, as many snags were present.

43. White-tailed deer frequented the area behind the pit, and tracks were often found on that side in the mud beside the pit. They were not as numerous at BP5 as at other pits, however. This is probably due to the closeness of the pit to the river, which gave only enough habitat for deer to use the area as a corridor.

44. A family of beavers lived on one of the larger islands, and two nutria were observed throughout 1982 in the pit. Other mammals sighted with regularity were striped skunks, fox squirrels, raccoons, opossums, swamp rabbits, and eastern cottontails.

45. Hunters, four-wheel drive vehicles, dogs, and bee hives were sources of disturbance behind the pit under usual circumstances. During the summers of 1982 and 1983, the Corps built and used a temporary road across the pit during construction and upgrading of the levee just north of this pit. After they completed their work, they cut a ditch across the road to allow water flow.

Borrow Pit 6

46. BP6 is located near Delta Point, 1.5 miles southwest of Delta, La., at RM 433 in Madison Parish. It adjoins the river levee and is 1.3 miles from the river. In 1981-1983, it was flooded three of the eight sampling periods.

47. BP6 has 15 small islands with trees or buttonbushes and is a series of five connecting pits; the newest is away from the levee behind a section filled with lotus and other rooted and floating aquatics. The landowner planted an eastern cottonwood plantation behind the newest pit section in 1982; an older stand of cottonwoods is approximately 5 to 7 years old. Most of the cottonwood understory in the older stand is cocklebur. The landowner leases the pit and levee area for cattle grazing, and the lessee keeps the area posted. He allows limited bank and boat fishing. Fishermen are almost always found here in abundance since this is the first pit at the levee entrance road from the town of Delta.

48. Approximately 30 percent of BP6 is less than 12 inches deep at bank-full, and this is filled with aquatic vegetation. One section of the pit, the one sampled by the WES fisheries field crew, is much deeper than the other sections. Woody vegetation at BP6 is predominantly black willow, with occasional American sycamores, eastern cottonwoods, American elm, Nuttall oak, and buttonbushes. No woody plants occurred on the levee side with the exception of an occasional small buttonbush. Vines and other understory plants were dense on the islands, but cattle kept them grazed elsewhere.

49. BP6 receives good bird use by all groups. Songbirds, cavity nesters, swallow species, and blackbird species are the primary users. Waterbirds frequent the newer pit section, especially great blue herons and great egrets. Migrating shorebirds also use that section. Mallards were seen during migration, and wood ducks used the pit year-round. The lotus served as cover for a number of roosting wood ducks in 1982. In 1983, the high, lingering flood-water killed back the lotus and other aquatics, and very little of it had recovered by fall 1983.

50. Raptor use was similar to BP1, 5 miles away. No northern bobwhite or wild turkey use was noted. An overwintering bald eagle was seen near BP6 in winter 1983 but was not seen during any of the sampling periods of the study.

51. White-tailed deer were frequently seen around the pit area, and the skull of a 1.5-year-old was found in 1982 on the bank. In high water they crossed the levee into small patches of bottomland hardwoods close to the levee. Coyotes or coyote tracks were seen with regularity.

52. A family of nutria lived on the largest island in BP6 in 1981-1982. The prolonged high water apparently caused them to move in 1983. Other

mammals found at BP6 included striped skunks, black and red fox squirrels, opossums, raccoons, eastern cottontails, and swamp rabbits. Beavers were seen on three occasions but did not seem to remain at the pit. In addition, river otters were found on one occasion but apparently did not live in the pit.

Borrow Pit 7

53. BP7 is located between Eagle Lake and the river, 5 miles west of the town of Eagle Lake, Miss., at RM 460 in Warren County. It adjoins the river levee and is 1.0 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded during five of the eight sampling periods.

54. There are three islands in BP7, and a narrow berm road between BP7 and the adjoining pit on the south is used by the landowner. The pit consists of an older pit, with two newer sections behind it. Large trees border the pit on the levee and behind, and other pits border on the north and south. The newer sections are only 2 feet deep; the older section is about 3 feet deep at bankfull. All dried out completely in the winter of 1981-1982. The pit is posted against both hunting and fishing by the landowners. Hunting with dogs occurred behind the pit and river in 1982, however. The landowners graze cattle throughout the pit area. In spite of this, the area behind BP7 has a lot of understory vegetation. The levee grass, predominantly Bermuda grass, is very closely cropped and never requires mowing. Since water flows through BP7 whenever the river rises, a great amount of drift has accumulated in the woods and along the berm road. It is bulldozed aside yearly by the landowner to keep the berm road open. The land across the levee is all open pasture, with an old levee and a 5-year-old cottonwood plantation close by.

55. Approximately 60 percent of the pit is covered with smartweeds, annual elder, and other weedy species; 40 percent is covered with snags and other weeds. The deeper area has three different duckweeds and azolla growing on it.

56. Woody vegetation is dominated by dead and live black willows and eastern cottonwoods on the levee side, with green ash, pecan, American sycamore, sweet gum, black willow, box elder, rose mallows, swamp privet, deciduous holly, American elm, buttonbush, honey locust, and Nuttall oak in mixed stands behind the pit. Numerous vines, shrubs, and forbs occur over the entire area. Cockleburrs were abundant.

57. BP7 receives heavy use by all groups of birds. Songbird use, especially by cavity nesters, is abundant. Waterbird use by great blue herons, great egrets, cattle egrets, little blue herons, green-backed herons, anhingas, double-crested cormorants, and white ibises occurs primarily as the water is receding or when the water level is very low. Waterfowl use is primarily by mallards and wood ducks. Wood ducks nested here both summers of the study, and broods were observed in the shallow sections.

58. Eastern screech-owls, barred, and great horned owls all occur at BP7. Red-tailed hawks, red-shouldered hawks, northern harriers, and American kestrels (and Mississippi kites in summer) also occur. Shorebirds were seen at low-water stages in fall and winter. Northern bobwhites lived on the levee side of BP7, and wild turkeys were abundant throughout the area. In late summer, flocks of 50 turkeys were not uncommon in both study years. They were observed both feeding on the levees and roosting in the woods.

59. White-tailed deer were abundant, and were seen at almost any time of day in the area. They were surprisingly unwary, considering the hunting pressure in the area. In one dusk survey from the pit down the levee road and into the town of Eagle Lake in the summer of 1983, nearly 100 deer were sighted in vehicle headlights. Around the pit, herds of 12 were common but groups of 2 to 3 were more likely. During the flood of 1983, many deer left the Eagle Lake area for the foothills, then returned when the water receded.

60. Two beavers were present in the pit in 1981-1982; in 1983 they were gone. This is probably due to a 12-foot-long alligator that moved into the borrow pit. It remained throughout the flood and the rest of 1983, and could be seen sunning on the levee. Its den was in the largest island in the pit.

61. Other mammals found at BP7 include fox squirrels, armadillos, opossums, raccoons, striped skunks, coyotes, and swamp rabbits. The most unusual mammal found at BP7 was encountered on a transect in summer 1983. A black bear was ambling through the bottomland hardwoods behind the pit; the cattle under the trees were very nervous over the bear's appearance and moved back onto the levee. However, the bear paid them no attention. It probably came over to the Eagle Lake area to escape from the floodwater.

Borrow Pit 8

62. BP8 is located near Waxhaw Landing Light, 3 miles north of Rosedale, Miss., at RM 593 in Bolivar County. It adjoins the river levee and is only 0.3 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded two of the eight sampling periods.

63. There are six small islands with trees or shrubs in BP8, and several peninsulas out into the water on the levee side. Landowners post the pit area, but fishing by local citizens is allowed. The landowners pasture over 200 head of cattle along this part of the levee, and the levee is severely overgrazed. There is no understory on the levee side, and the main vegetation is closely cropped Bermuda grass and unpalatable pasture weeds such as bitter sneezeweed, thistles, dog fennel, broom sedge, and others. Land across the levee is planted in soybeans.

64. BP8 is deep enough to provide permanent water during drought; only 20 percent is less than 12 inches deep at bankfull. There are virtually no aquatic plants visible in the water, probably due to the intensity of the cattle-grazing pressure. Many livestock ponds have no aquatic plants because cattle cloud the water and also graze the aquatic vegetation until it is gone.

65. Woody vegetation on the levee side consists of occasional water locusts, American sycamores, green ashes, eastern cottonwoods, and swamp privets. Woody vegetation behind the pit where no grazing is allowed includes American sycamore, green ash, black willow, eastern cottonwood, roughleaf dogwood, box elder, osage orange, hickories, honey locust, water locust, slippery elm, swamp privet, sugarberry, persimmon, and rose mallows. Where grazing is allowed, woody vegetation is similar to that found on the levee side. Vines and dense understory occur where there is no grazing.

66. Bird use at BP8 was not as diverse or abundant as at other pits, although numerous songbirds were observed. Great egrets, great blue herons, and green-backed herons were found in small numbers, and numerous cattle egrets were present with the cattle. Wood ducks, mallards, and blue-winged teal were the only waterfowl seen, and their numbers were small. Raptor, owl, and shorebird use was nominal, but Mississippi kites were present each year. Cavity nesters were common, and migratory swallows were frequent users of the pit. Barn swallows and chimney swifts were present in summer months also.

Northern bobwhites occurred behind the pit in the more open areas, but no wild turkeys were heard or seen.

67. White-tailed deer tracks were seen behind the pit with regularity, but deer were always sighted as individuals or in groups of no more than three. Other mammals observed at BP8 were striped skunks, opossums, raccoons, fox squirrels, and swamp rabbits.

Borrow Pit 9

68. BP9 is located near Victoria Bend, 2 miles southwest of Gunnison, Miss., at RM 595.5 in Bolivar County. It, BP8, and BP11 are all within a few miles of one another, and are all generally across the river from the mouth of the White River, an important tributary of the Mississippi. The older section of BP9 adjoins the river levee; the new section is behind the older one. The pit is 0.9 mile from the river and floods at least yearly. In 1981-1983, it was flooded three of the eight sampling periods.

69. Three islands are in the larger, newer section; this section is shallower than the older section, which is deep enough to provide permanent water during drought. The landowners post against hunting but allow fishing. However, few fishermen have been seen during sampling periods. Trees border the levee over almost the entire pit, except the older section. The levee is grazed by cattle and horses, and the predominant levee vegetation is Bermuda grass. The large fields across the levee are usually planted in soybeans.

70. Approximately 30 percent of the pit is less than 12 inches deep at bankfull, and the same area is covered with duckweeds and pondweeds. Primary woody vegetation throughout the pit area is black willow, with some osage orange, honey locust, Nuttall oak, overcup oak, eastern cottonwood, swamp privet, and roughleaf dogwood occurring as well. Herbaceous plants, especially annual elder, cocklebur, and dock species, occur in open areas, and vines are common.

71. Bird use in BP9 was heavy. Songbirds were primarily open-country species, swallows, blackbirds, and cavity nesters. Waterbird use was primarily in summer months by great blue herons, great egrets, green-back herons, and little blue herons, all of whom fed in the shallow portions of the newer pit section. Waterfowl use was quite good in both winters; in winter

1981-1982, large numbers of gadwalls, wood ducks, mallards, American black ducks, blue-winged teal, and American wigeons stayed in BP9.

72. Barred and eastern screech-owls hunted in the pit area, and red-tailed hawks, red-shouldered hawks, northern harriers, and American kestrels were fairly common, especially in winter. Mississippi kites were present in summer months. Wild turkeys occurred here, and migrating and summer-resident swallow species were very common. Few shorebirds were sighted during any sampling period, except killdeers, which were year-round residents.

73. White-tailed deer were sighted on the river side of BP9, and tracks were commonly found in the mud around the pit. They usually were seen as individual animals and not in groups. Two families of beavers lived at BP9 in 1982. Neither group was seen after floodwater receded in 1983 until the fall. Other mammals found at BP9 include fox squirrels, striped skunks, opossums, raccoon, swamp rabbits and, in 1983, a lone red fox.

Borrow Pit 10

74. BP10 is located near Millikens Bend, 2 miles southeast of the Madison Parish River Port, at RM 456 in Madison Parish, La. The pit adjoins the river levee and is only 100 yards from the river. BP10 floods at least yearly and in 1981-1983 was flooded during five of the eight sampling periods.

75. The pit is very small and deep; only about 20 percent is less than 12 inches deep at bankfull and there are no islands in the pit. Landowners post against hunting but allow fishing by local citizens, a common occurrence. During high river levels, the pit is so close to the river that tugboats appear to be coming into the pit as they pass by. Cattle and horses graze the levee side of the pit, but cannot cross over to the river side. Dominant vegetation on the levee is closely cropped Bermuda grass mixed with pasture weeds. The land across the levee is planted in large soybean fields.

76. Woody vegetation consists almost entirely of black willows and eastern cottonwoods, although an occasional honey locust, American sycamore, green ash, sugarberry, osage orange, overcup oak, or bald cypress occurs between the pit and the river. Vines are abundant on the river side, especially peppervine.

77. Bird use of BP10 is relatively good, and in winter 1981-1982, hooded mergansers, buffleheads, mallards, and wood ducks were found here. Northern bobwhites were more numerous here than at most other pits, but no wild turkeys were seen or heard. Blackbird species, cavity nesters, and swallow species were abundant at the appropriate seasons, and common grackles and red-winged blackbirds nested in large numbers at the southern end of the pit in black willows.

78. Owls were not heard or seen, but red-tailed hawks, American kestrels, and northern harriers were common. A mixed waterbird colony was located close by; herons and egrets flew over the pit in large numbers all day, but especially at dawn and dusk, in spring and summer.

79. White-tailed deer use at the pit was only occasional, as deer passed from one area to another. Tracks were found during several sampling periods. A family of beavers lived in the banks of BP10 on the river side during the entire study and cut down several large trees on the levee slope. Other mammals found include striped skunks, raccoons, opossums, armadillos, and numerous cottontails. No swamp rabbits were found.

Borrow Pit 11

80. BP11 is located near Hurricane Point, 2 miles north of Gunnison, Miss., at RM 602 in Bolivar County. It adjoins the river levee and is 3.6 miles from the river. It floods yearly and in 1981-1983 was flooded two of the eight sampling periods. BP11 is the largest pit in the study.

81. There are numerous islands in BP11 and eight connecting sections. Bottomland hardwoods surround the pit on the levee side, south end, and about half of the river side. Soybeans are planted in large fields on the rest of the river side. Another borrow pit joins BP11 on the northern end. Two hunting clubs control most of the pit, and a plantation controls the northern end. Approximately 20 to 30 small houses and trailers are scattered on the southern end close to the levee (hunting camp) and people live there year-round. Cattle graze the levee side up to the water's edge, and the understory has been noticeably impacted. The main levee vegetation is closely cropped Bermuda grass and pasture weeds. Land across the levee is planted in soybeans and cotton.

82. This pit is quite deep, with permanent water, and less than 10 percent of it is less than 12 inches deep at bankfull; there are very few aquatic plants in the pit. Buttonbush and small willows dominate the vegetation on the low islands.

83. Woody vegetation on all sides of the pit consists primarily of osage orange, American sycamore, eastern cottonwood, sugarberry, green ash, box elder, black willow, bald cypress, honey locust, swamp privet, deciduous holly, Nuttall oak, overcup oak, hickories, buttonbush, and water locust. There are numerous vines, herbaceous plants, and grasses throughout the pit area.

84. Bird use of this pit is heavy by some groups: songbirds, owls and raptors, swallows, gamebirds (especially turkeys), and cavity nesters. It receives little use by waterfowl; only wood ducks, mallards, American coots, and blue-winged teal were found. Small numbers of waterbirds were found; the deepness of the water probably prevented more use. Green-backed herons in summer seemed to be the primary waterbird users other than cattle egrets. Mississippi kites nested at BP11 both summers of the study. Blackbirds roosted here in the winter of 1981-1982.

85. White-tailed deer were plentiful, but it was difficult to make a population estimate. During hunting season, the deer congregated in the woods on the levee side of the pit, away from the deer stands and hunters on the river side. During the rest of the year, only an occasional deer was seen on the levee side but tracks were encountered with regularity.

86. At least three families of beavers lived in this huge pit and remained through the 2 years of the study. No muskrats, otters, or nutria were present. Both gray and fox squirrels lived at BP11; this is one of the few pits where gray squirrels were found. Opossums, raccoons, striped skunks, eastern cottontails, swamp rabbits, a red fox, and several coyotes were other mammals found at BP11.

87. Domestic cats, dogs (hunting and domestic), fishermen, hunters, other people, and many cattle were always present in the pit area during sampling periods. The land was posted against hunting, but fishing by local citizens was allowed.

Borrow Pit 12

88. BP12 is located near Waterproof Cutoff, 2 miles south of Waterproof, La., at RM 377 on the Tensas/Concordia Parish line. It adjoins the river levee and is 0.8 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded four of the eight sampling periods.

89. BP12 is a series of 10 connected pools with no islands. The water is generally deep; only about 15 percent is less than 12 inches deep at bank-full, and there are almost no aquatic plants. The landowner has posted the land against all trespassing and keeps grazing cattle on the levee, around the pit, and all the way to the river. The area had been badly overgrazed for a number of years, and there is no understory or low-hanging branches on trees within reach of cattle. The primary herbaceous vegetation on the levee and all sides of the pit is closely cropped Bermuda grass and pasture weeds. The landowner usually patrolled his land twice a day. In summer 1982 (and probably on other occasions), cows on the levee were shot by poachers; only their hind quarters were removed and carried off for meat. This occurs in other areas along the levee as well, especially close to towns and cities. The land across the levee is planted in soybeans.

90. Primary woody vegetation around the pit is dominated by black willow, with an occasional American sycamore, eastern cottonwood, osage orange, bald cypress, deciduous holly, honey locust, Nuttall oak, swamp privet, overcup oak, American elm, and sugarberry. Some vines persist in spite of the grazing pressure.

91. Resident songbird use is not as great at this pit as at most others. Great blue herons, great egrets, and little blue herons feed here year-round, and green-backed herons, snowy egrets, and anhingas are present in summer. During migration, wood storks roosted in the willows on the river side of the pit. Cattle egrets were also numerous almost year-round. Almost no waterfowl were seen at this pit. Swallow species, cavity nesters, and blackbird species were all common. Black and turkey vultures were also found at BP12 and, on one occasion, were feeding on a dead cow on the levee.

92. Red-tailed hawks, northern harriers, American kestrels, and barred owls hunted over the pit. In summer, Mississippi kites were observed over the pit. Migrating shorebirds seldom stopped here; the water apparently was too deep for their feeding and there were no beach areas on BP12.

93. White-tailed deer tracks were seen on a few occasions; they apparently were passing through the open area, as the pit provides very little cover. One beaver was seen in 1982, and chewed sticks were found on two other occasions. The beaver apparently did not stay, as it was not sighted again. Other mammals found at BP12 were striped skunk, raccoon, opossum, coyote, eastern cottontail, fox squirrel, and armadillo.

Borrow Pit 13

94. BP13 is located near Montezuma Bend, 6 miles south of Helena, Ark., at RM 656 in Phillips County. It adjoins the levee on its south end and is only 0.35 mile from the river. It floods at least yearly and in 1981-1983 was flooded during three of the eight sampling periods. The pit curves around a sharp elbow turn in the levee.

95. Only one section of the pit has deep permanent water at bankfull; the rest has been ditched and drained by the landowners and planted in soybeans. In the winter and spring the drained pit is flooded several feet deep. The deepest section of BP13 is used frequently by campers, picnickers, and fishermen and has a diving board and swim ladder in the deepest part. The land between the pit and river and the land across the levee is all planted in soybeans. Throughout the 2-year study, the landowners were bulldozing brush and trees from borrow pits in the area and burning the dozer piles, with intentions of using the land for more soybeans. The original BP13 that was sampled for fish by WES had been bulldozed away by the time the wildlife study began, and the next pit to the north was chosen to be BP13 for wildlife purposes.

96. The levee is pastured with cattle and is badly overgrazed. As many as 300 head of cattle have been grazed on that section of levee at one time. The main levee vegetation is pasture weeds and closely cropped Bermuda grass. There is almost no understory vegetation.

97. Woody vegetation in the scattered groups of trees around the pit area is predominantly osage orange. American sycamore, eastern cottonwood, honey locust, American elm, deciduous holly, sugarberry, and some black willow occasionally occurred.

98. Use by songbirds at the deeper section with permanent water was not very good, but increased significantly in the woods around the soybean fields

where no grazing was allowed. Migrating swallow and shorebird species were abundant, especially tree swallows, sandpipers, yellowlegs, willets, and others. Almost no waterbird use was noted at any time of year except by cattle egrets. A few blue-winged teal and mallards were observed during migration. Ring-billed gulls strayed over from the river occasionally in the winter. Shorebird use of shallow open areas was heavy.

99. Owls were not heard or seen around the permanent water area, but red-tailed hawks, American kestrels, and northern harriers hunted over the open areas. Northern bobwhites were found away from the grazed area, and large flocks of blackbird species gathered at the pit. Cattle egrets were found with the herd of cattle.

100. No white-tailed deer were even seen here. A family of river otters lived in the deep pool section and had several slides on steep banks leading into the water. The only other mammals seen at BP13 were striped skunks, raccoons, fox squirrels, and eastern cottontails. Some beaver-cut stalks were found in 1983 in the water, but beavers were never seen at the pit.

Borrow Pit 14

101. BP14 is located near the mouth of the Arkansas River, an important tributary of the Mississippi, 5 miles northeast of Rowher, Ark., at RM 584.4 in Desha County. It adjoins the river levee and is 6.3 miles from the river, further than any other pit. The pit floods infrequently, and flooded only once during the eight sampling periods of the 2-year study.

102. BP14 is long and narrow, with three connecting berms and several small islands on the river side. There is no woody vegetation on the levee side, and the levee slope grass is cut and baled for hay. In summer 1983, it was burned off as well. The vegetation on the levee side is predominantly Johnson and Bermuda grasses. The area behind the pit is controlled by three hunting clubs. There are several cabins with year-round residents on the river side. The land across the levee is planted in rice, and there are a number of houses just across the levee from the pit. No cattle grazing occurs, and the landowners plant winter wheat directly behind the pit on the southern end. The rest of the river side is bordered in bottomland hardwoods.

103. Primary woody vegetation on the river side of BP14 consists of black willow, eastern cottonwood, American sycamore, sweet gum, Nuttall oak,

honey locust, pecan, sugarberry, persimmon, box elder, water oak, American elm, and other hardwoods. Vines and understory were dense in the woods and along the riverside shore. Bottomland hardwoods extend the entire 6 miles to the river, interspersed with food plots planted by the hunting clubs.

104. Only about 15 percent of the pit is less than 12 inches deep at bankfull, and there are few aquatic plants. However, at low water, wading bird use is excellent, and fishing attracts many people year-round. The land is posted against hunting, but fishing by local citizens is allowed.

105. Songbird use is quite good, as birds from both woods and open areas frequent the pit area. In summer months large groups of snowy and great egrets feed in the shallows; great blue herons, green-backed herons, and little blue herons were also present in low numbers. Mallards and wood ducks were year-round residents and both nested around BP14; broods of both species were found. During migration, blue-winged teal, numerous mallards, northern pintails, northern shovelers, hooded mergansers, American black ducks, and wood ducks stopped over at BP14. Shorebirds, primarily sandpipers and yellowlegs, were seen in migration also.

106. Swallow species occurred in very large numbers during migration, especially barn, bank, northern rough-winged, and tree swallows; purple martins; and chimney swifts. Cliff swallows were also found in small numbers. Great horned, barred, and eastern screech-owls lived in the woods on the river side; common barn-owls apparently lived in the vicinity also. All hunted over and around the pit. Red-tailed hawks, rough-legged hawks, American kestrels, red-shouldered hawks, and northern harriers were all observed hunting over the pit, primarily in winter and spring.

107. Northern bobwhites live in the brush in open areas around BP14, and at least one large flock of wild turkeys lives in the vicinity; they came to the pit from the woods and fed in the open fields between the pit and woods.

108. Mammal use was also heavy, and white-tailed deer seemed to be abundant. Numerous tracks in the mud and in the road behind the pit were found, and deer were always observed in groups around the pit area. Habitat between the river and pit was excellent, diverse, and protected, so this large population would not be unusual.

109. Two families of beavers lived in the pit area. No river otters were ever seen, but one muskrat was observed during one sampling period. No muskrat houses were ever found. Other mammals sighted include striped skunks,

fox and gray squirrels, raccoons, red foxes, opossums, eastern cottontails, and swamp rabbits. Domestic dogs were found with regularity, and domestic cats hunted around the pit often.

Borrow Pit 15

110. BP15 is located near Montezuma Bend, 1.5 miles south of the US Highway 49 Mississippi River bridge, at RM 659 in Coahoma County, Miss. It is almost directly across from BP13 in Phillips County, Ark. BP15 adjoins the levee and is 1.0 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded three of the eight sampling periods.

111. There are numerous small islands and snags throughout the pit, which is quite shallow. In winter 1981-1982, it dried up completely on the southern end, and only a small pool remained on the northern end. Duckweeds, smartweeds, nutsedges, and other rooted aquatics cover about 50 percent of the pit; 50 percent of the pit is estimated to be less than 12 inches deep at bankfull.

112. The levee is pastured with cattle, but not overgrazed. It is baled for hay as well. Dominant vegetation on the levee slopes is Bermuda grass in good stands. The river side of the pit is fringed in black willows, and the area behind the pit is planted in soybeans. A plantation tenant settlement is directly across from the pit, and children, pets, and fishermen are almost always present at the pit. BP15 is posted against hunting, but fishing by local citizens is allowed and fishing pressure is heavy both from the bank and by boat. The pit is behind a locked gate and fence, but fishermen crawl through enough to keep a permanent path around the gate.

113. The predominant tree, by far, is black willow; it is the only tree on most of the small islands within the pit. Other woody plants include eastern cottonwood, osage orange, green ash, sugarberry, bald cypress, box elder, buttonbush, silver maple, swamp privet, deciduous holly, rose mallows, honey locust, and water locust. These species are almost all on each end of BP15 where the berms are higher than the rest of the pit. Vines are abundant, and the understory is dense on the southern end of the pit away from the settlement. The largest trees occurring are eastern cottonwoods and occasional American sycamores.

114. Songbird use is good but not as diverse as at other pits. Cavity nesters abound, and little blue herons, green-backed herons, great egrets, and great blue herons all feed here. Waterfowl use seemed to be limited to wood ducks that occurred year-round; a few mallards were seen in migration.

115. Primarily in winter and spring, red-tailed hawks and American kestrels were frequently seen hunting over the area. Barred and eastern screech-owls live around the pit and hunt over the area. No northern bobwhites or wild turkeys were seen. Blackbird flocks were large in winter and during migration, and an occasional shorebird was sighted. Swallow species were abundant in migration, and purple martins, chimney swifts, and barn swallows fed over the pit in summer as well.

116. A family of beavers set up residence after the 1983 flood on the southern end of the pit. Other mammals sighted or tracks found include coyotes, raccoons, opossums, swamp rabbits, eastern cottontails, and striped skunks. Muskrats lived on the islands in the pit also.

117. Occasional deer tracks were found at BP15; no deer were ever sighted at the pit.

Borrow Pit 16

118. BP16 is located near the Morville Light, 6 miles northeast of Deer Park, La., on Louisiana Highway 15, at RM 355.5 in Concordia Parish. It adjoins the river levee and is only 0.2 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded four of the eight sampling periods.

119. BP16 is a series of 10 pools connected by breaches in the berms. There are several islands with trees, vines, and understory in the center of the pit. The entire area is pastured with cattle from levee slope to river, and is overgrazed. The pit is posted against hunting, fishing, and all forms of trespassing, and the landowner patrols the levee road. Levee slope vegetation outside the pasture fence is predominantly Johnson and Bermuda grasses in good stands; inside the pasture fence on the levee slope the vegetation is primarily closely cropped Bermuda grass and pasture weeds. Land across the levee is planted in rice and soybeans; these fields are extensively fed on by overwintering ducks from Catahoula Lake NWR, but very few ducks come over the levee to the borrow pits.

120. The pit is relatively deep and does not dry up during drought; less than 10 percent is less than 12 inches deep at bankfull, and almost no aquatic plants were found. There are almost no snags and brush around the pit, and the closest woods are several miles away. Woody vegetation is limited to the small islands and to a group of black willows, American sycamores, and eastern cottonwoods at the northern end of the pit. There is no other woody vegetation and no understory due to heavy grazing pressure.

121. In spite of the poor vegetation conditions, bird use of BP16 is still good, primarily by open-country species and those that frequent the river. Sparrows and other songbirds were found on the islands and scattered over the area in low numbers. Waterbirds comprised one of the major groups using the pit. Ring-billed and herring gulls, Forster's terns, common terns, great egrets, great blue herons, anhingas, little blue herons, double-crested cormorants, green-backed herons, cattle egrets, snowy egrets, and white ibises all fed in the edges of the pools and around the pit. Migrating and summer swallows were abundant.

122. Mallards, American coots, wood ducks, hooded mergansers, blue-winged teal, canvasback, and lesser scaup occasionally used the pit during migration or in winter. Shorebirds frequented this pit; lesser and great yellowlegs, water pipits, common snipe, spotted sandpipers, least sandpipers, dowitchers, willets, black-necked stilts, killdeers, and semipalmated plovers were all observed at BP16.

123. Woodpeckers and other cavity nesters were found in the willows and on the island, and northern harriers, red-tailed hawks, and American kestrels hunted over the area. Mississippi kites were seen in small numbers in summer months. Broad-winged hawks migrated over the area in large numbers but made no use of the pit. No owls or wild turkeys were seen, but northern bobwhites lived in the area around the levee fence.

124. No white-tailed deer were ever seen here; however, in 1983 after the floodwater receded, two sets of tracks were found in mud at the pit. A family of beavers lived on the largest island and seemed to feed primarily on the black willows. They cut down several each year. The only other mammals noted at BP16 were striped skunks, opossums, raccoons, armadillos, and eastern cottontails. Domestic dogs were seen at the pit; they came from two farms north of the pit.

Borrow Pit 17

125. BP17 is located near Morgan Point, 5 miles east southeast of Wilson, Ark., at RM 773 in Mississippi County. It is near the mouth of the Hatchie River, a small tributary of the Mississippi. It adjoins the river levee and is 3.0 miles from the river. BP17 does not flood yearly, but flooded once during the eight sampling periods of the study.

126. BP17 is long and narrow, with several small islands in it. It is shallow, and about 50 percent is less than 12 inches deep at bankfull. It was almost completely dry in winter 1981-1982 and in fall 1983. Approximately 40 percent is covered with smartweeds, nutsedges, and other mudflat plants. The levee side of the pit and levee slope are grazed by cattle and horses, and the land between the pit and levee is planted with soybeans. A narrow fringe of woody and herbaceous vegetation hangs over the pit on the river side. Bottomland hardwoods grow at both ends of the pit. The land is posted against hunting, but fishing by local citizens is allowed. Fishermen in boats and on the bank were present at every warm-weather sampling period. In summer 1983, the levee, predominantly Bermuda grass and tall fescue, burned off in such a hot fire that there were large cracks in the levee soil surface.

127. Primary woody vegetation along the pit consists of sweet gum, eastern cottonwood, American elm, black willow, eastern red cedar, rose mallows, red mulberry, persimmon, Shumard oak, American sycamore, deciduous holly, buttonbush, honey locust, sugarberry, green ash, box elder, water locust, bald cypress, silver maple, osage orange, hickories, and Nuttall oak in mixed stands. Vines and understory over much of the area were sparse.

128. A number of songbird species occurred at BP17, especially sparrows and other brush species, swallow species, and cavity nesters. Waterbird use was fair; little blue herons, cattle egrets, green-backed herons, great blue herons, snowy egrets, great egrets, and yellow-crowned night herons were present in low numbers in warm weather. Several duck species were observed in the pit, including American wigeon, blue-winged teal, green-winged teal, wood ducks, northern pintails, northern shovelers, and nesting mallards. Blackbird species occurred in large flocks in fall and winter.

129. Barred and eastern screech-owls hunted over the pit, as did red-tailed hawks, rough-legged hawks, northern harriers, American kestrels, and

sharp-shinned hawks. There were two to three northern bobwhite coveys around the pit area, but no wild turkeys were heard or seen.

130. Beavers and muskrats lived in the pit. Beavers cut several large trees at the southern end of the pit both years, and muskrats lived in the middle of the pit where the smartweed marsh was very dense. Other mammals seen were red foxes, striped skunks, opossums, raccoons, eastern cottontails, and fox squirrels. No white-tailed deer were noted until after the 1983 flood; then, a few tracks were found in the mud near the northern end of the pit.

131. The land across the levee is planted in soybeans, and there are several houses directly across the levee. People and pets were often at the pit.

Borrow Pit 18

132. BP18 is located directly across the levee from Shaw, La., on Louisiana Highway 15, at RM 323 in Concordia Parish. It adjoins the river levee and is 1.8 miles from the river. The pit floods at least yearly and in 1981-1983 was flooded four of the eight sampling periods.

133. The pit has an older section near the levee and a larger, newer section behind the older one. As the pit dries out, mudflats that had young black willow, eastern cottonwood, and American sycamore trees growing on them are exposed. Forty percent of the pit is less than 12 inches deep at bank-full, and 50 percent is covered with smartweeds, duckweeds, grasses, and tree sprouts. The pit is surrounded on all sides by trees. BP18 is part of the Red River Wildlife Management Area; hunting and fishing are allowed at the pit. No cattle graze the area, and the levee is mowed in the summer months. The predominant levee vegetation is Johnson and Bermuda grasses. The Johnson grass was poisoned with a selective herbicide in 1982 and 1983 but still persists.

134. The main woody vegetation around BP18, by far, is black willow and eastern cottonwood of varying ages and sizes. Other woody vegetation, especially between the river and pit, includes deciduous holly, buttonbush, American sycamore, swamp privet, sugarberry, honey locust, Nuttall oak, and hickories. Numerous vines and dense understory occur. All the understory

dropped its leaves during the prolonged high water in 1983, but regenerated rapidly after the water receded.

135. Bird use at BP18 was very good, especially by cavity nesters, swallow and blackbird species, and waterbirds. Great blue herons, great egrets, little blue herons, white ibises, pied-billed grebes, American coots, double-crested cormorants, anhingas, and green-backed herons all occurred with regularity most of the year. The grebes nested on the pit bank and raised a brood of two. The double-crested cormorants apparently had a colony site close by, as they stayed at the pit most of the summer in 1982. During the aerial survey in spring 1982, a mixed colony of herons and egrets was found nesting about 5 miles away. Wood ducks also nested in the pit area; broods were present both summers. During migration, hooded mergansers, wood ducks, and mallards were observed in the pit.

136. Red-tailed hawks, northern harriers, American kestrels, and Mississippi kites all hunted over the pit area. Broad-winged hawks were found in the pit trees during spring migration. No northern bobwhites or wild turkeys were seen or heard.

137. White-tailed deer were plentiful in the area, and deer tracks and deer were frequently seen. A family of beavers lived in the pit, and some nutria were also present. Other mammals sighted were striped skunks, opossums, raccoons, coyotes, swamp rabbits, and fox squirrels.

Borrow Pit 19

138. BP19 is located near Williams Point, 1 mile southeast of Point Pleasant, Mo., at RM 877.6 in New Madrid County. It adjoins the river levee and is 0.8 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded three of the eight sampling periods.

139. BP19 has several small clumps of woody vegetation in the pit and is quite shallow. It was dried up completely during three of the eight sampling periods and was flooded in three others. The pit is surrounded by trees, and the fields behind the pit are planted in soybeans. The levee was not grazed in 1982 and was mowed; in 1983 it was fenced and grazed prior to planting time. It was predominantly tall fescue and native red clover. The pit is not posted. When the pit dried out in 1981, people in four-wheel-drive vehicles used it for racing and spinning. In 1982 and 1983, when the pit was dry, the

pit bed was covered with nutsedges. The land across the levee is planted in sorghum.

140. Woody vegetation around the pit is predominantly black willow. Other woody plants, primarily in the bottomland hardwoods at the southern end of the pit, are American sycamore, eastern cottonwood, honey locust, water locust, sweet gum, sugarberry, slippery elm, silver maple, and sassafras. The vines and understory are dense on the southern and northern ends of the pit, and there are a number of snag trees.

141. Bird use at BP19 by cavity nesters and blackbird species is common. Other songbird use is primarily by open-country species. Waterbird use occurs year-round, especially in summer when the pit is drying out. Great blue herons, great egrets, yellow-crowned night herons, little blue herons, and green-backed herons were all observed in varying numbers. During migration, blue-winged teal, northern shovelers, mallards, and wood ducks were all found here. Shorebirds also frequented the pit, especially as it dried out.

142. Barn and eastern screech-owls, red-tailed hawks, American kestrels, and rough-legged hawks hunted over the pit. Three coveys of northern bobwhites were seen in the vicinity and were found around the pit at different times; no wild turkeys were present at BP19.

143. No white-tailed deer use was noted. Beaver signs were found during one sampling period, but no beaver was seen living in the pit. Other mammals observed at BP19 include mink, longtail weasel, striped skunk, spotted skunk, coyote, red fox, eastern cottontail, raccoon, and opossum. Dogs from the nearby village and houses were seen in every sampling period.

Borrow Pit 20a

144. BP20a is located approximately 3 miles northeast of the Old River Lock, on Louisiana Highway 15 at RM 305.8 in Concordia Parish. It and BP20b are near the Red River and Atchafalaya River system. The pit adjoins the river levee and is 0.3 mile from the river. BP20a floods at least yearly and in 1981-1983 was flooded four of the eight sampling periods.

145. This pit appears to be older than its counterpart, BP20b, and the pit contains numerous scattered black willows that are 20 to 40 feet tall. The pit is not pooped, but only fishing use seems to occur; fishermen were the only people ever seen at the pit. The levee is not grazed, and is mowed. The

predominant levee slope vegetation is Bermuda and Johnson grasses. The land across the levee holds a large stand of good bottomland hardwoods, where hunting does occur.

146. Primary woody vegetation at BP20a is black willow. On the levee side and on an old berm behind the pit honey locust, American sycamore, eastern cottonwood, box elder, green ash, persimmon, red maple, and buttonbush occur. Vines and understory are dense. Three duckweed species flourish on the water year-round; in summer the pit is totally covered with it. The pit is not deep and almost dried completely during drought; 40 percent of the pit is less than 12 inches deep at bankfull and 60 percent on average is covered with duckweeds. In summer it approaches 100 percent cover.

147. Primary bird use is by cavity nesters and blackbird species. Great blue herons, great egrets, cattle egrets, anhingas, double-crested cormorants, green-backed herons, and little blue herons have all been observed on a nearly year-round basis. Double-crested cormorants, black-crowned night herons, anhingas, and green-backed herons are present only in warm weather. Wood ducks were the only waterfowl species seen, and the broods were observed both summers in the pit.

148. Red-tailed hawks, red-shouldered hawks, and American kestrels were all seen hunting over the pit and levee.

149. White-tailed deer were seen in the mud around the pit with regularity, and an occasional deer was spotted. Both beaver and nutria use was heavy here and, during the 1983 flood, seven river otters were found at this pit. Other mammals observed were red fox squirrels, opossums, raccoons, swamp rabbits, and striped skunks. Dogs were also seen accompanying fishermen.

Borrow Pit 20b

150. BP20b is located approximately 2 miles northeast of the Old River Lock, on Louisiana Highway 15 at RM 305.1 in Concordia Parish. It adjoins the river levee and is 0.3 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded during four of the eight sampling periods. It is only about 4 years old.

151. Approximately 40 percent of the pit is less than 12 inches deep at bankfull, and in winter 1981-1982, it was almost completely dried out. It did not remain dry long enough for new vegetation to colonize the mudflats. The

predominant woody vegetation is black willows; young ones grow along the levee side, and older willows grow along the south end. Other occasional woody vegetation includes American sycamore, honey locust, eastern cottonwood, green ash, box elder, and persimmon. Vines and understory around BP20b are dense, and a large variety of herbaceous plants occur. The levee slopes are mowed, and the predominant levee vegetation is Bermuda and Johnson grasses.

152. Sparrows and brush species, cavity nesters, and blackbird species were the major songbird users. Great blue herons, great egrets, snowy egrets, white ibises, anhingas, green-backed herons, little blue herons, and cattle egrets were all found in considerable numbers when the pit was not flooded, and during receding water periods and drought, large numbers of waterbirds fished in the shallow water.

153. Wood ducks were the only waterfowl found in BP20b. Killdeer and sandpipers of several species fed at the shallow water edges during the dry periods. Barred owls, red-tailed hawks, northern harriers, and American kestrels all hunted over the pit, and Mississippi kites were seen in summer and in migration.

154. White-tailed deer frequented the area; tracks and signs were seen at every sampling period, and an occasional deer was seen between the pit and river. Nutria were abundant in this pit at the beginning of the study. By mid-1982, beavers were also in the pit, and by 1983, only beavers remained, in fewer numbers than the nutria had been. No otters or muskrats were seen here. Other mammals observed were striped skunks, swamp rabbits, eastern cottontails, black and red fox squirrels, numerous raccoons, and opossums.

155. BP20b is near a natural water slough that is a very popular fishing area. Campers frequently come into the area and fish at the pit, sometimes for a weekend or several days. Fishermen with boats fished the pit also, so the disturbance in this small pit was considerable.

Borrow Pit 21

156. BP21 is near Island Eleven Bar Light, 2 miles north of Point Pleasant, Mo., at RM 881 in New Madrid County. It adjoins the levee and is 2.2 miles from the river. The pit only floods every 3 to 10 years, and in 1981-1983 it was flooded once during the eight sampling periods.

157. BP21 has several small islands and is very shallow. It almost dried out in winter 1981-1982, and again in fall 1983. The pit had trees on the levee side and both ends. The land between the pit and river is planted in soybeans, and the land across the levee is planted in sorghum. The pit is not posted, and fishing does occur, but not frequently.

158. Approximately 40 percent of the pit is less than 12 inches deep at bankfull, but there are very few aquatic plants. Good herbaceous cover occurs on the pit banks, and vines and understory are dense. The levee slope is mowed; no grazing occurs. The predominant levee vegetation is tall fescue and native red clover. Woody vegetation is diverse and includes osage orange, American elm, slippery elm, silver maple, sassafras, eastern cottonwood, black willow, red maple, pin oak, bur oak, and Shumard oak. These hardwoods are primarily in the bottomland hardwood stand on the southern end of the pit. Snags are plentiful.

159. Primary songbird use was by cavity nesters, blackbird species, and sparrows and brush species. Great blue herons, green-backed herons, and little blue herons were the only waterbirds seen at the pit, and migrating blue-winged teal, mallards, and wood ducks were the only waterfowl that were seen.

160. Rough-legged hawks, red-tailed hawks, American kestrels, and northern harriers were seen with regularity in winter, and red-tailed hawks were almost abundant; three to four at once could be seen around the pit, perched in the trees. Huge flocks of blackbird species, especially red-winged blackbirds, were seen in fall; they were feeding in the nearby sorghum and millet fields. Northern bobwhites were common here also.

161. Both beavers and muskrats lived in the pit during the entire 2-year study. Both fox and gray squirrels were found. No white-tailed deer or deer signs were seen. Other mammals observed included striped skunks, spotted skunk, opossum, longtail weasel, raccoon, and eastern cottontail.

162. Dogs and children from Point Pleasant played at the pit, and farming activities caused irregular disturbances from traffic and equipment. In late summer 1983, the southern end of the pit was ditched and drained. The trees had not been cut, and no reasons for the ditching were evident.

Borrow Pit 22

163. BP22 is located 0.5 mile north of the Old River Control Structure and just south of Black Hawk Plantation on Louisiana Highway 15, at RM 315 in Concordia Parish, La. It adjoins the levee and is 0.6 mile from the river. The pit floods at least yearly and in 1981-1983 was flooded two of the eight sampling periods.

164. BP22 is a relatively new pit, with several small islands and peninsulas in it, and several sections. It receives a great deal of disturbance from many sources. During the 2-year study, Corps bulldozers cleared the vegetation in the immediate vicinity of the pit and pushed the debris into the water in 1982. In 1983, a man on a tractor moved fill dirt that was hauled in by truck to the pit; he was probably a member of the hunting club that controlled nearby property. Fishermen fished and hunters passed through the pit. Pasture lessees brought their cattle through the area, the river flooded to a record level, and truckers and loggers parked their rigs on the levee beside the pit.

165. The levee and pit are not grazed, and the levee is mowed. Predominant vegetation on the levees and around the pit outside the woods is Johnson and Bermuda grasses. The land between the river and pit is pastured with cattle. The land across the levee is planted in soybeans. The adjoining property upriver is Black Hawk Plantation, and the batture is controlled by Big Willow Hunting Club. Downriver is the Old River Control Structure. The pit is on the Three Rivers Wildlife Management Area.

166. Approximately 20 percent of the pit is less than 12 inches deep at bankfull, and very few aquatic plants occur. There are no snags or brush in the water, but grasses and forbs grow along the banks. A few black willow sprouts were growing there. The pit had bottomland hardwoods on all four sides in small woodlots.

167. Woody vegetation within 30 yards consists of good mixtures of sweet gum, Nuttall oak, overcup oak, American sycamore, American elm, eastern cottonwood, green ash, water oak, box elder, sugarberry, rough-leaf dogwood, deciduous holly, and hawthorn. Vines are abundant in the trees, and understory cover is good except in deep shade. A widely diverse herbaceous and grassy community occurs.

168. There is abundant songbird use at this pit by year-round residents, migrants, and winter and summer residents. Cavity nesters are common, and eastern screech-owls nested in the trees around the pit. Sparrows and brush species were abundant in winter. Great blue herons, great egrets, snowy egrets, cattle egrets, green-backed herons, and little blue herons were all seen at BP22. Black and turkey vultures were present primarily in winter. They were found feeding on dead cattle in the area and roosting at the pit. Of the waterfowl species, only wood ducks were found, and no broods were ever seen at this pit.

169. Red-tailed hawks, red-shouldered hawks, American kestrels, and northern harriers were all observed at this pit. Mississippi kites nested here in a tall tree in 1982, and broad-winged hawks passed through in large numbers during the spring migration. No wild turkeys or northern bobwhites were seen or heard.

170. No white-tailed deer were found at the pit, but deer tracks within the 30-yard limit were found in the woods. Both nutria and beaver lived here in 1982; the nutria apparently moved on with the 1983 flood. Other mammals seen at BP22 include striped skunk, opossum, coyote, raccoon, swamp rabbit, eastern cottontail, and fox squirrel. No muskrats or otters were found at this pit. Coyotes were found eating on the cattle carcasses, as were opossums.

Borrow Pit 23

171. BP23 is located near Cow Island Bend, 5 miles northwest of Walls, Miss., at RM 720 in Shelby County, Tenn. It is at least 500 feet from the levee and is not visible from a levee observation point except in winter. BP23 is 1.2 miles from the river and floods at least yearly. In 1981-1983, it was flooded during three of the eight sampling periods.

172. There are several islands in the pit, and it is surrounded on all sides by bottomland hardwoods. Cocklebur Lake is just across the berm road from the pit, and a culvert allows water exchange. Apparently, fishing is good from this spot, as both humans and raccoon families have been observed fishing in front of this culvert.

173. The levee is pastured with cattle, but they are fenced away from the pit. There are four locked gates between the county access road to the levee

and the borrow pit--two kept by the Levee Board and two kept by the Rogue Hunting Club, the group that controls the pit. It is posted against all trespassing. Access to the pit could only be obtained by climbing the gates and walking in, in spite of having written permission from the landowners to conduct the study. The permanent observation point for this pit was on the east side along the berm road. The hunting club allows fishing by local citizens, however, and fishermen were occasionally found at the pit even in very cold weather.

174. Approximately 30 percent of the pit is less than 12 inches deep at bankfull, and most of the shallow area had pondweeds growing in it. There are quite a few snags on the shore and in the woods, but not in the water. Woody vegetation along the shore is predominantly black willows and rose mallows. The bottomland hardwood vegetation surrounding the pit includes mixtures of bald cypress, American sycamore, eastern cottonwood, black willow, bur oak, overcup oak, Nuttall oak, water oak, pecan, American elm, hickories, sugarberry, water locust, honey locust, sweet gum, green ash, buttonbush, red maple, swamp privet, and silver maple. Vines and understory vegetation are dense except in heavy shade. A diverse herbaceous community occurs also.

175. BP23 receives very heavy songbird use, especially by swallow species, sparrow and brush species, cavity nesters, and deep woods species. It also receives a lot of waterbird use; in 1982, a small mixed colony of black-crowned night herons, little blue herons, yellow-crowned night herons, great blue herons, cattle egrets, and green-backed herons nested on one of the islands with small trees. About 15 nests could be seen with binoculars; no attempt to boat to the colony was made. Great egrets also were occasionally found feeding in the shallows.

176. In winter and during migration, large groups of ducks were found, including mallards, wood ducks, gadwalls, American wigeons, American black ducks, American coots, ring-necked ducks, blue-winged teal, green-winged teal, hooded mergansers, lesser scaup, northern pintail, and northern shovelers. Mallards and blue-winged teal were the most common, and wood duck broods were seen on the pit both summers.

177. Great horned, barred, and eastern screech-owls were all heard or seen at BP23. Flocks of thousands of swallows and purple martins were observed in spring and fall resting in dead snags and feeding over the pit and Cocklebur Lake. Little shorebird use, except by killdeers, was noted;

however, at various times, sandpipers and yellowlegs were observed. A bald eagle was seen hunting over the lake in 1983 but was not counted in the survey. Red-tailed hawks, red-shouldered hawks, northern harriers, American kestrels, and an osprey were all seen over the pit or perching in trees. Wild turkeys were found in the woods at the southern end of the pit.

178. White-tailed deer use at BP23 is heavy, and tracks, signs, and deer were noted at every sampling period. Both beavers and muskrats were seen; beavers were more plentiful and lived at BP23 throughout the 2-year study. Other mammals observed were striped skunks, opossums, numerous raccoons, fox and gray squirrels, eastern cottontails, swamp rabbits, and coyotes.

Borrow Pit 24

179. BP24 is located directly across the levee from Remy, La., between Hester and St. Elmo Lights, at RM 151 in St. James Parish. It adjoins both the levee and the river; only a berm separates it. The borrow pit floods at least yearly and in 1981-1983 was flooded during six of the eight sampling periods.

180. BP24 is long and narrow. Approximately 15 percent is less than 12 inches deep at bankfull, but it has almost no aquatic plants. It is surrounded by black willows and, at its northern end, by bottomland hardwood vegetation. The levee is not grazed, although an occasional cow or horse is found tied up on the levee to graze; the Levee Board mows the slopes on a regular basis. Predominant levee vegetation is Bermuda and Dallis grasses. In the 1983 flood, the water came within about 15 feet of topping the levee.

181. There are so many sources of disturbance at BP24 that it is surprising to find any wildlife use. A grain company and elevator operate just past the pit on the south; a barge loading terminal operates 24 hours a day in the pit itself. People from the town across the levee treat the levee as a public park and ride bikes, motorcycles, and three-wheelers on the levee top. They also shoot fireworks, stroll, shoot rifles, and walk their pets; children play in the pit. At Christmas, bonfire towers built on the levee each year are lit; wood for tower construction is cut from the trees at the pit. The levee slopes burn off each year. People use the entire length of the pit, especially the northern end in the trees, as a public dump and a place to abandon old cars. The southern end of the pit is lighted with floodlights

every night, and the industrial noises are loud and highly disturbing. Both years after the floodwater receded, the Levee Board used a bulldozer to push into the pit whatever garbage had not washed away; in fall 1983, a loading terminal employee was bulldozing fill dirt into the pit so they could expand their operations.

182. The predominant woody vegetation, by far, is black willow. On the northern end, occasional eastern cottonwood, American sycamore, swamp privet, red maple, buttonbush, pecan, green ash, American elm, sugarberry, honey locust, roughleaf dogwood, box elder, and American elderberry occur. Swamp privet is mixed with black willows along the levee side of the pit as well. Vines and understory are dense on all sides except at the berm road crossing over to the loading terminal.

183. A surprising amount of songbird use occurs here, primarily by blackbird species, cavity nesters, sparrows and brush species, and swallow species. Common grackles and red-winged blackbirds nest here in large numbers. Great egrets, great blue herons, green-backed herons, little blue herons, and cattle egrets were the only waterbirds noted at BP24, and they occurred in small numbers. Ring-billed, laughing, and herring gulls and common terns were also seen in small numbers as they flew in from the river. A few redheads in migration were the only waterfowl found at this pit.

184. No owls were seen or heard. American kestrels and northern harriers were rare but did hunt over the area. Huge flocks of blackbird species year-round, and swallow species in migration and summer, used the pit for roosting and feeding. The most unusual sightings here were budgerigars (parakeets), LeConte's sparrows, gray catbirds in winter, and orange-crowned warblers.

185. The primary mammals around the pit were people and their pets. A beaver lived at the northern end in early 1982 but had been trapped by summer 1982; the traps were left set for months in the pit. After the 1983 flood, beaver signs and chewed twigs were found, but no beavers were seen. The only other mammals found at BP24 were opossums and raccoons.

186. The river water stayed above flood stages and up the levee banks from November 1982 until August 1983. The pit was also flooded from February to July 1982, although not to the depth experienced in 1983.

Borrow Pit 25

187. BP25 is located on 81 Mile Point, 1 mile west of Darrow, La., at RM 180 in Ascension Parish. It adjoins the levee and is 0.2 mile from the river as it parallels the pit, and adjacent to the river on the southern end where the river and levee make a sharp elbow turn. BP25 floods at least yearly and in 1981-1983 was flooded three of the eight sampling periods.

188. BP25 is long, narrow, and very deep. Approximately 5 percent is less than 12 inches deep at bankfull, and very few aquatics occur, although some duckweeds accumulate at the southern end each summer. The pit is surrounded by trees and shrubby vegetation. It was excavated when the original levee failed and a new levee had to be constructed; since little land was available to obtain fill, the pit is very deep. The levee on the northern end of the pit collapsed in the 1983 flood and is currently being rebuilt. Some of the fill material is coming from the southern end of BP25, where a sand and gravel company operates anytime the river is not too high.

189. Sources of disturbance here are also numerous, although probably not as great as at BP24. People race three-wheelers on the levee. They also camp out for weekends and several-day stays at the pit when the water is down. Fishing pressure is heavy both by boat and from the bank. A sand and gravel company hauls fill material from the southern end of the pit, and a barge loading terminal operates at the northern end. Barges and oceangoing vessels anchor off both BP24 and BP25. People also use the pit as a public garbage dump and, as at BP24, the Levee Board bulldozes into the pit whatever garbage is not carried off by the river. No Christmas bonfires are constructed here, however, because it is too far from town. Also, since the industries do not operate 24 hours a day, the pit is not illuminated at night as is BP24.

190. The levee is not grazed, and the Levee Board mows the grass. The predominant levee vegetation is Bermuda and Dallis grasses. Black willow is the primary woody plant around the pit. Other woody vegetation occurring in the woods includes eastern cottonwood, American sycamore, box elder, Chinese tallow tree, sugarberry, American elderberry, roughleaf dogwood, buttonbush, bald cypress, wax myrtle, red maple, rose mallows, green ash, swamp privet, deciduous holly, honey locust, live oak, and pecan. Swamp privet and black willows grow nearest the pit banks. Vines and understory are abundant except in deepest shade.

191. The disturbances occurring at BP25 seem to have little impact on songbirds, and a widely diverse community exists here. Blackbirds, swallows, sparrows, and brush species are very common. Unusual species sighted include sharp-tailed sparrows, LeConte's sparrows, orange-crowned warblers, and gray catbirds in winter. Hundreds of American robins were present in winter; they were more common in 1981-1982 when the water levels were lower.

192. Waterbirds used this pit infrequently for feeding because of its depth. However, great blue herons, little blue herons, cattle egrets, and green-backed herons were observed, and green-backed herons nested in the dense shrubs along the pit bank. Ring-billed, laughing, and herring gulls flew over the pit area as they came in from the river. No waterfowl were ever seen at BP25.

193. Barred owls were observed, and red-shouldered hawks, red-tailed hawks, and American kestrels hunted over the area. Mississippi kites nested in the top of one of the tallest trees in the summer. No northern bobwhites or wild turkeys were expected or found; however, American woodcocks were found in winter feeding in the wet woods and along the shore.

194. A family of beavers lived at the pit throughout the 2-year study at the northern end and were observed feeding all over the pit area. The only other mammals seen at BP25, besides domestic pets, were opossums, armadillos, striped skunks, raccoons, and eastern cottontails. Fox squirrels were seen in trees across the levee, but none were found in trees around the pit.

END

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